SOIL SURVEY

Jasper County Missouri

Series 1942, No. 5

Issued March, 1954

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with the
UNIVERSITY OF MISSOURI AGRICULTURAL EXPERIMENT STATION

How To Use THE SOIL SURVEY REPORT

FARMERS who have worked with their soils for a long time know about soil differences on their own farms, and perhaps about differences among soils on farms owned by their immediate neighbors. What they do not know, unless soil surveys have been made, is how nearly their soils are like those on experiment stations or other farms, either in their State or other States, on which new or different farming practices or enterprises are in operation. Farmers of Jasper County can avoid some of the risk and uncertainty involved in trying new crops and soil management practices by using this soil survey report, for it gives them an opportunity to compare their own soils with soils on which new developments have proved successful.

SOILS OF A PARTICULAR FARM

The soils of Jasper County are shown on the map in the envelope inside the back cover of this report. An inch on this map equals 1 mile on the ground. To learn what soils are on a particular farm or tract of land, first locate the boundaries of the farm or tract on the map by referring to section, township, and range lines and by noting roads, streams, villages, dwellings, and other landmarks. The next step is to identify the soils on the farm or tract. Each area of each kind of soil is shown on the map with a symbol and distinguishing color. The map legend gives the name of each soil and the symbol and color used on the map to identify that soil. For example, all areas on the map marked with the symbol Lb are Labette silt loam, and all areas so marked are the same color, wherever they appear on the map.

If you wish to know what Labette silt loam is like and for what it is used, turn to the section on Soil Types and Phases. If you want to learn about suitable uses and management practices for it, refer to the section on Use and Management of Important Groups of Soils. If you desire to know how productive it is, consult table 2. You will find the name Labette silt loam in the left-hand column of table 2, and in columns following you can read the yields of different crops this soil can be expected to produce. You can compare these yields with those given in the table for other soils mapped in the county.

SOILS OF THE AREA AS A WHOLE

A general idea of the soils in the county is given in the section Soil Series and Their Relations, which tells about the principal kinds of soils, where they are found, and how they are related to one another. After reading this section study the soil map and notice how the different kinds of soils are grouped according to colors. These groupings correspond with the management groupings given in the section Use and Management of Important Groups of Soils; that is, all soils suited to the same general use and management are shown in one color. These groupings reflect well-recognized differences in types of farming, land use, and land-use problems.

A newcomer to the county, especially if he considers purchasing a farm, will want to know about the climate; the types and sizes of farms; the principal farm products and how they are marketed; the kinds and conditions of farm tenure, including tenancy; the kinds of farm buildings and equipment; the availability of churches, roads, schools, railroads, telephone, and electric services, and water supplies; the industries of the county; and the cities, villages, and population characteristics. Information about all these will be found in the section on General Nature of the Area or in the section on Additonal Facts about Jasper County.

Those interested in how the soils of the county were formed and how they are related to the great soil groups of the world should read the section on Morphology, Genesis, and Classification of Soils.

This publication on the soil survey of Jasper Count, Mo., is a cooperative contribution from the—

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SOIL SURVEY OF JASPER COUNTY, MISSOURI

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United States Department of Agriculture in cooperation with the University of Missouri Agricultural Experiment Station

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[1] The Division of Soil Survey was transferred to the Soil Conservation Service on November 15, 1952.

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ABOUT two-thirds of Jasper County is rolling prairie; the rest is hilly land, some of which is still forested. Agriculture and mining are the leading industries. Farming is carried on throughout the county, but mining is limited to the southwestern and western parts. A large number of small farms in the mining area produce little marketable surplus because they are operated on a part-time basis by persons with other employment. The full-time farms outside the mining area produce mainly cash crops of corn and small grains, hay, and forage. Livestock raising is important, and income from the sale of beef cattle, hogs, sheep, and poultry and dairy products exceeds that from cash field crops. Creameries, flour and feed mills, and other plants within the county process farm products. Transportation to outside markets is good. To provide a basis for the best agricultural uses of the land, a cooperative soil survey was made by the United States Department of Agriculture and the University of Missouri Agricultural Experiment Station. Field work was completed in 1942, and, unless otherwise specifically indicated, all statements in this report refer to conditions in the county at that time.

GENERAL NATURE OF THE AREA

Jasper County, located in southwestern Missouri, borders Kansas and is the third county north of the Arkansas-Missouri line (fig. 1). Carthage, the county seat, is 55 miles west of Springfield and 135 miles south of Kansas City. Joplin, a mining and industrial center, is in the southwestern part. The area of the county is 405,760 acres, or 634 square miles.

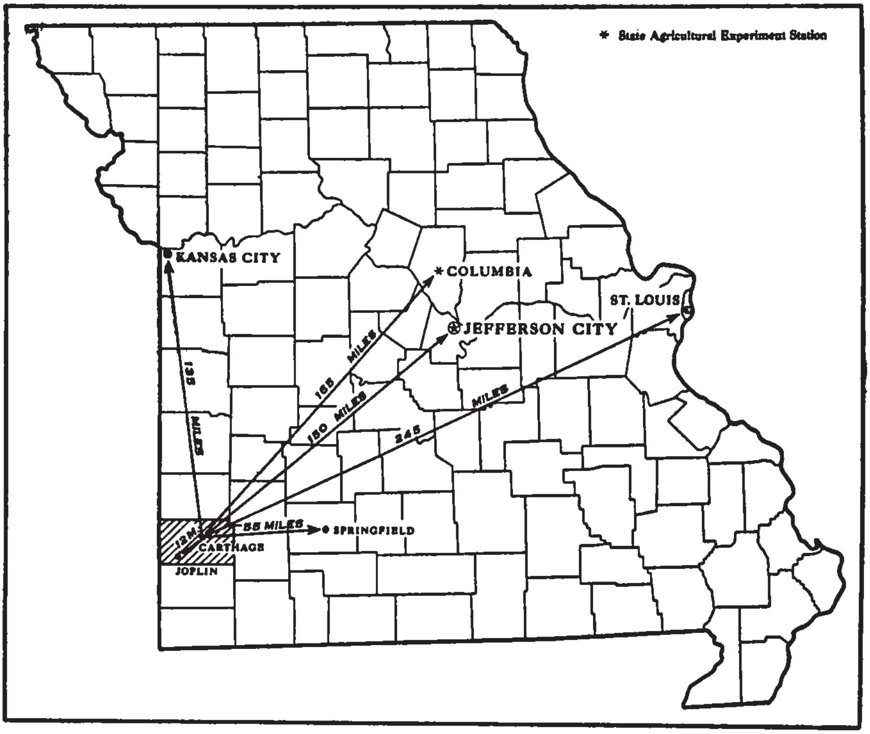

FIGURE 1.—Location of Jasper County in Missouri.

Settlement began about 1830 (*6*)[2] and the county was organized in 1841. Most of the settlers came from Kentucky, Tennessee, or Virginia, but some were from Illinois and Ohio. The first railroad in the county was completed in 1871. Mining of zinc and lead assumed importance by about 1870 and attracted large numbers of workers.

The population of the county was 79,106 in 1950. In that year Carthage had a population of 11,188; and the population of Joplin, the largest town, was 38,711. Joplin is primarily a mining center but is also an important market for agricultural products.

PHYSIOGRAPHY, RELIEF, AND DRAINAGE

The county is on the western edge of the Ozark Plateaus province. About one-third of it has hilly topography and is made up of light-colored stony soils that were forested. Most of the forested soils are from cherty limestone. The areas still forested occur in relatively narrow bands on slopes along the major streams.

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[2] Italic numbers in parentheses refer to Literature Cited, p. 67.

Approximately two-thirds of the county is a gently rolling to nearly level prairie plain, a part of the larger Osage Plains section in Kansas and Oklahoma. The prairie soils occur over limestone containing variable quantities of chert in the eastern part of the county and over shale and sandstone in the western and northwestern parts. The prairie soils in the western and northwestern parts are generally lighter colored and less productive than the limestone-prairie soils in the eastern part.

Some slopes are steep, but they are short, and relief is low. In general there is a difference in elevation of about 100 feet between the crests of divides and the flood plains of major stream valleys. Elevations range from 1,200 feet near the southeastern corner of the county to 826 feet at the point where the Spring River enters Kansas.

Drainage is to the west, and the streams empty into the Neosho River (Grand River) in Oklahoma, which flows to the south. Spring River and Center Creek are the main streams. The principal streams, towns, and highways of the county are shown in figure 2.

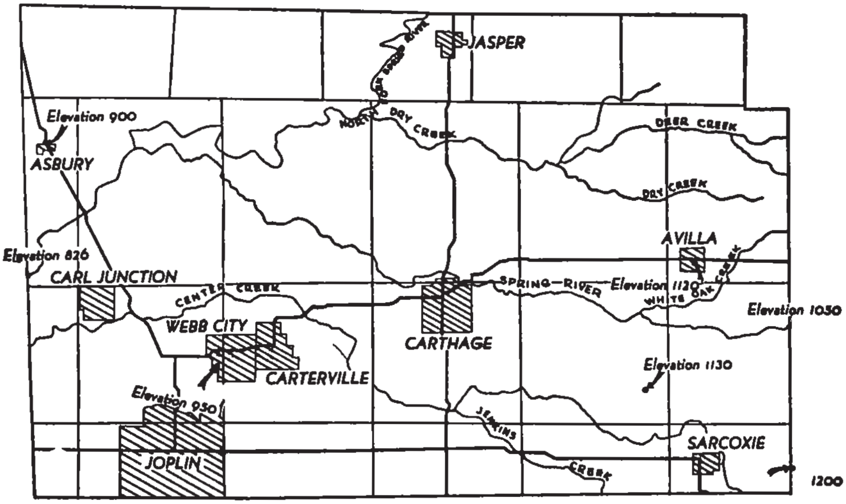

FIGURE 2.—Principal streams, towns, and highways in Jasper County, Mo.

CLIMATE

Jasper County has a humid continental climate characterized by warm summers, cold winters, and maximum rainfall in early summer. As is true for all of the central plains of which this county is a part, rainfall and temperature are subject to wide daily, monthly, seasonal, and annual variation.

The monthly, seasonal, and annual temperatures and precipitation considered normal, or average, for this county are shown in table 1. These figures were compiled from records of the weather station at Joplin, in Jasper County, Mo., and are used in the following discussion.

The mean annual rainfall is 43.72 inches, but the total rainfall in the driest year (1919) was only 30.73 inches, whereas in the wettest year (1915) it was 62.35 inches. Monthly rainfall also is variable. For the month of August it has varied from 2.06 inches in the driest year to 7.47 inches in the wettest. More than 5 inches of rainfall in 1 month is not unusual, but months almost without rain also occur. The differences in precipitation between winter and summer are marked. The mean summer rainfall is 14.59 inches, as compared to the mean winter precipitation of 5.73 inches.

Most of the summer rains come as thundershowers of short duration but high intensity, and the rain clouds generally do not persist for more than a few hours. Winter precipitation generally comes as gentle rain, mist, snow, or sleet, and the sky may be overcast several days at a time. Some snow falls every year, but it usually disappears within a few days.

The mean January temperature is 34.9° F., but the absolute maximum for that month is 76°, and the absolute minimum is −10° The mean July temperature is 78.1°; the absolute maximum, 104°; and the absolute minimum, 55°.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Joplin, Jasper County, Mo.*

[Elevation, 988 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total for the driest year	Total for the wettest year	Average snowfall
	°F.	*°F.*	*°F.*	*Inches*	*Inches*	*Inches*	*Inches*
December	39.2	74	−14	1.89	0.52	2.63	2.4
January	34.9	76	−10	2.16	0	2.26	4.3
February	35.8	84	−21	1.68	.92	3.65	6.1
Winter	36.6	84	−21	5.73	1.44	8.54	12.8
March	48.6	94	6	3.20	1.39	3.16	.9
April	58.5	94	25	4.70	5.03	4.87	.1
May	66.3	96	32	5.36	2.73	8.51	0
Spring	57.8	96	6	13.26	9.15	16.54	1.0
June	73.4	100	45	6.00	8.60	9.27	0
July	78.1	104	55	4.62	2.39	3.41	0
August	77.3	99	52	3.97	2.06	7.47	0
Summer	76.2	104	45	14.59	13.05	20.15	0
September	72.1	98	35	3.92	.98	12.60	0
October	60.2	93	24	3.45	4.46	1.83	.3
November	48.3	82	1	2.77	1.65	2.69	.2
Fall	60.2	98	1	10.14	7.09	17.12	.5
Year	57.7	104	−21	43.72	[1] 30.73	[2] 62.35	14.3

[1] In 1919.

[2] In 1915.

The importance of temperature variations should not be overemphasized, because the extremes of either heat or cold are generally of short duration. The variability of the rainfall, however, is of great agronomic importance. Inspection of data on mean monthly rainfall in table 1 would lead to the conclusion that precipitation is almost ideally distributed for crop production. The rainfall during April, May, June, and July is high, and the mean for June is 6 inches. Contrary to appearances, however, the combination of soil and climatic factors is such that rainfall is a limiting factor in crop production nearly every year. The means in table 1 do not reveal the fact that rainfall is variable from season to season and unevenly distributed throughout the growing season. Drought conditions prevailed during some part of the growing season every year in the period 1934–44. The summer drought of 1936 lasted without an appreciable break for 61 days. Also, much of the summer rain comes in thundershowers and falls so rapidly that much of it is lost as runoff. Following a summer downpour, there may be a period of 12 to 25 days or more in which no effective rainfall occurs.

The winter season is characterized by alternate freezing and thawing temperatures, which favor frost heaving when the ground is wet. Frost heaving is especially severe on the claypan soils. Alfalfa and sweetclover are the crops most frequently damaged by frost heaving, but small grains are affected in some winters.

The average date of the last killing frost in spring is April 8, and the first in fall is October 30. The average length of the frost-free growing season is 204 days. Even the shortest growing season is ample for the maturing of crops grown in the county, but late spring frosts do damage fruit crops severely in some years.

The monthly average relative humidity is highest in January and lowest in October.[3] The relative humidity in January is 84, 70, and 72 at 8 a. m., noon, and 8 p. m., respectively; whereas the relative humidity in October is 80, 52, and 60 at comparable hours. During summer this area receives 71 percent of the possible sunshine, and in winter, 52 percent. The sun is therefore obscured 29 percent of the time in summer and 48 percent of the time in winter.

WATER SUPPLY

The county is in an area where streams are fed by springs. The Spring River, Center Creek, White Oak Creek, and a number of smaller tributary streams are spring-fed and flow throughout the year. Water for municipal areas is obtained from deep wells. Shallow wells, deep wells, and cisterns supply water for household and livestock use in rural areas; the supply from those sources is augmented by springs, streams, and ponds.

In the rural areas in the eastern and central parts of the county—the part underlain by limestone rock—most of the water for household use is obtained from shallow wells or relatively shallow (200 to

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[3] Data on relative humidity and sunshine is from records of the United States Weather Bureau station at Springfield, Mo.

400 feet deep) drilled wells. The water supply in this part of the county is generally adequate and of good quality.

In the part of the county underlain by sandstone and shale rock formations, the deep wells generally have to be drilled to a greater depth than in the eastern part, and more reliance is placed on cisterns for household water and on ponds for livestock water.

Water power is utilized at four places along the Spring River and at one point on Center Creek. Low dams placed across the streams raise the water level 6 to 12 feet, and most of the power developed is used for operating mills. A part of the power used in extracting soybean and linseed oil at a plant at Galesburg is furnished by water. A number of other mills have been built along the Spring River in the past, but the dams are now destroyed and the mills abandoned.

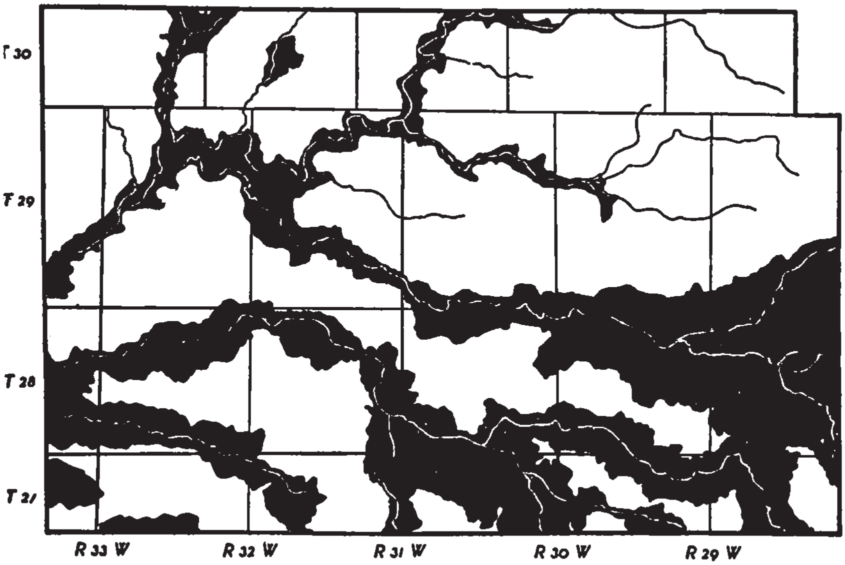

FIGURE 3.—Distribution of forested and prairie areas in Jasper County, Mo. Dark areas, forest; light areas, prairie.

VEGETATION

The forested areas of the county occur in bands of varying width along the major streams, where they occupy steeply sloping land and extend across narrow ridges (fig. 3). They are dominantly forested with oaks. White and red oaks are dominant, but post oak, blackjack oak, and elm also occur. The Baxter soils support a mixed forest of red oak, hickory, elm, and walnut. Post oak and blackjack oak prevail on the Nixa soil. White oak predominates on Bodine soils.

The prairie areas include the broad nearly level to gently rolling interstream divides. On these prairies big bluestem and little bluestem were the dominant grasses. Most of the native prairie vegetation has been destroyed in the eastern part of the county, but in the western part several square miles of virgin prairie remain.

The vegetative cover on some of the rolling land is intermediate between forest and prairie. In these areas sumac, blackberries, dewberries, and a few elm, hackberry, wild cherry, and crabapple trees grow in association with the prairie grasses.

LAND USE AND TYPES OF FARMING

Land in farms totaled 83.1 percent of the county in 1945, and of this total, 174,814 acres were harvested cropland; 20,367 acres, plowable pasture; and 26,210 acres, woodland. The land not in farms, totaling 69,323 acres in 1945, is concentrated in the southwestern part of the county and is composed principally of urban areas or mining developments.

The nearly level area of prairie soils in the northwestern part of the county—the Parsons and Cherokee soil area—is in general a cash-grain or hay-producing section. Agriculture is diversified in most of the rest of the county. Dairy farms are somewhat more numerous on the prairie soils derived from limestone. Farms specializing in beef cattle are predominant in the area of stony and cherty soils.

THE SOILS OF JASPER COUNTY AND THEIR USE, MANAGEMENT, AND PRODUCTIVITY

This section consists of three major parts. The first gives yields to be expected on soils of the county under two levels of management; the second groups soils of the county according to similarities in characteristics and discusses each group in a general way; the third describes in detail each soil mapped and gives the use and management it now receives.

ESTIMATED YIELDS

Estimated average acre yields to be expected over a period of years under two levels of management are given in table 2. The yields listed in columns A are those to be expected under ordinary management, and in columns B those to be expected under the best management practices now feasible. Ordinary management is that now practiced by most farmers in the county and in general conforms with the management described for individual soils in the section on Soil Types and Phases. Suggestions for good management are found in the section on Use and Management of Important Groups of Soils. These suggestions usually involve liming, fertilization, and improved tillage, as well as other practices mentioned for the different groups.

The columns in table 2 for alfalfa contain several references to footnote No. 2, which explains that this crop probably will not do well on the soil specified. It will be noted that the claypan soils, as the Gerald, Parsons, and Cherokee, are especially unfavorable for this crop. Alfalfa probably can be raised, even on the level phases of the soils indicated as unfavorable, but the cost of establishing a stand may be high, considering the probable short life of the stand.

TABLE 2.—*Soils of Jasper County, Mo.. Average per acre yields to be expected over a period of years and relative suitability for forest*

[Yields in columns A are obtained under ordinary management; those in columns B, under good management; blank spaces indicate yield data are lacking]

Soil	Map symbol	Corn		Wheat		Oats		Lespedeza hay		Alfalfa hay		Brush-cleared pasture (cow-acre-days)[1]		Forest
		A	B	A	B	A	B	A	B	A	B	A	B	
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*			
Bates fine sandy loam, gently sloping phase.	BA	20	40	12	25	20	35	0.5	1.5	0	2.5		40	
Baxter cherty silt loam:														
Gently sloping phase	BB	20	40	13	28	25	40	1.0	1.5	0	3.5	24	46	Good.
Sloping phase	BC	20	30	13	23	22	40	1.0	1.5	0	3.5	24	46	Do.
Baxter stony silt loam:														
Gently sloping phase	BD							.9	1.2			17	38	Do.
Sloping phase	BE											17	38	Do.
Bodine stony silt loam:														
Gently sloping phase	BF							.7	1.0			15	30	Fair.
Moderately steep phase	BG											15	30	Do.
Boone fine sandy loam:														
Gently sloping phase	BH	15	30	10	20	15	30	.5	1.0	0	2.0	15	30	Do.
Sloping phase	BK	15	30	10	20	15	30	.5	1.0	0	2.0	15	30	Do.
Boone stony fine sandy loam, moderately steep phase.	BL											15	20	Do.
Cabanal loamy fine sand, gently sloping phase.	CA	20	35	10	20	20	40	.5	1.5	0	2.0	17	38	Good.
Carytown silt loam	CB	20	35	15	20	25	40	1.5	1.7	0	(2)	30	57	
Chat piles	CC	0	0	0	0			0	0	0	0	0	0	Very poor.
Cherokee silt loam	CD	15	35	10	20	15	30	0	1.0	0	(2)		38	

See footnotes at end of table.

TABLE 2.—*Soils of Jasper County, Mo.: Average per acre yields to be expected over a period of years and relative suitability for forest*—Continued

[Yields in columns A are obtained under ordinary management; those in columns B, under good management; blank spaces indicate yield data are lacking]

Soil	Map symbol	Corn		Wheat		Oats		Lespedeza hay		Alfalfa hay		Brush-cleared pasture (cow-acre-days)[1]		Forest
		A	B	A	B	A	B	A	B	A	B	A	B	
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*			
Collinsville fine sandy loam:														
Gently sloping phase	CE	15	20	10	20	12	25	(3)	1.0	0	(2)	30	38	
Sloping phase	CF	15	20	10	20	12	20	(3)	1.0	0	(2)	30	38	
Collinsville stony fine sandy loam, sloping phase.	CG	----	----	----	----	----	----	----	----	----	----	23	33	
Connor silt loam	CH	10	30	8	18	12	25	0	1.0	0	0	15	30	Poor.
Craig cherty silt loam, gently sloping phase.	CK	25	40	12	25	20	45	1.0	1.5	0	2.5	30	45	
Cumberland gravelly silt loam	CL	20	50	15	30	25	50	1.0	1.5	0	3.5	23	50	Good.
Cumberland silt loam	CM	25	60	15	30	30	55	1.5	2.0	0	4.0	23	50	Do.
Dennis silt loam, gently sloping phase	DA	25	50	15	25	25	45	1.0	2.0	0	3.5	----	50	
Dunning silt loam	DB	20	60	15	25	30	45	1.5	2.0	(3)	(2)	30	75	
Dunning silty clay loam	DC	20	40	15	20	25	40	1.5	2.0	(3)	(2)	40	85	
Eldon cherty silt loam:														
Gently sloping phase	EA	25	40	15	25	25	40	1.0	1.5	0	3.0	----	45	
Nearly level phase	EB	25	40	15	25	25	40	1.0	1.5	0	3.0	----	45	
Eldon silt loam:														
Gently sloping phase	EC	25	50	15	25	25	40	1.0	1.5	0	3.0	----	45	
Nearly level phase	ED	25	50	15	25	25	40	1.0	1.5	0	3.0	----	45	
Eldorado stony silt loam:														
Gently sloping phase	EE	----	----	----	----	----	----	----	----	----	----	30	40	
Sloping phase	EF	----	----	----	----	----	----	----	----	----	----	30	40	

Elk silt loam	EG	30	50	15	25	25	50	1.0	1.5	0	3.0	17	55	Do.
Gerald silt loam:														
Depressional phase	GA	20	50	12	23	20	30	1.0	1.5	0	0	-----	50	
Level deep phase	GB	25	50	15	28	25	40	1.5	2.0	0	(2)	-----	45	
Level phase	GC	25	50	15	28	25	40	1.0	2.0	0	(2)	-----	45	
Level shallow phase	GD	20	40	12	24	20	40	1.0	1.5	0	(2)	-----	45	
Nearly level deep phase	GE	30	55	15	28	25	45	1.0	2.0	0	3.0	-----	50	
Nearly level shallow phase	GG	20	40	12	28	20	40	1.0	1.5	0	3.0	-----	50	
Nearly level phase	GF	25	50	15	28	25	45	1.0	2.0	0	3.0	-----	50	
Huntington gravelly silt loam	HA	35	55	15	25	25	45	1.0	1.5	2.5	3.5	30	60	Do.
Huntington silt loam	HB	40	65	15	30	30	50	1.5	2.0	3.0	4.0	30	60	Do.
Dark phase	HC	45	65	18	30	30	50	1.5	2.0	3.0	4.0	30	60	Do.
High-bottom phase	HD	45	65	18	30	30	50	1.5	2.0	3.0	4.0	30	60	Do.
Inola silt loam:														
Level phase	IA	20	40	10	25	20	40	(2)	1.5	(2)	2.5	-----	45	
Nearly level phase	IB	18	40	10	25	25	45	(2)	1.5	(2)	(2)	-----	45	
Labette silt loam:														
Gently sloping phase	LA	30	60	15	28	30	45	1.5	2.0	0	4.0	-----	60	
Nearly level phase	LB	30	60	15	28	30	45	1.5	2.0	0	4.0	-----	60	
Lightning silt loam	LC	15	35	10	18	15	30	(2)	1.5	0	(2)	17	46	Fair.
Lindside and Huntington soils	LD	35	45	-----	-----	20	35	1.0	2.0	-----	-----	30	60	Good.
Lindside silt loam	LE	35	60	12	22	25	40	1.5	2.0	1.5	3.5	30	60	Do.
High-bottom phase	LF	40	65	15	24	30	45	1.5	2.0	1.5	4.0	30	75	Do.
Melvern gravelly loam, gently sloping phase.	MA	15	35	12	22	20	35	.5	1.0	0	2.0	-----	40	
Melvin silt loam	MB	15	35	10	20	15	25	.5	1.0	0	0	30	45	Poor.
Neosho silt loam	NA	15	35	10	18	20	30	(2)	1.0	0	(2)	-----	38	
Newtonia cherty silt loam:														
Gently sloping phase	NB	25	45	12	22	25	45	1.0	2.0	0	3.5	-----	38	
Sloping phase	NC	25	45	12	20	20	45	1.0	2.0	0	3.5	-----	38	
Newtonia silt loam:														
Gently sloping phase	ND	30	60	15	28	30	45	1.0	2.0	0	4.0	-----	45	
Nearly level phase	NE	30	65	15	28	30	45	1.0	2.0	0	4.0	-----	45	
Nixa cherty silt loam, gently sloping phase.	NF	15	45	12	20	20	35	1.0	1.5	0	3.0	20	38	Fair.
Parsons loam:														
Level phase	PA	15	35	13	24	20	40	.5	1.5	0	(2)	-----	38	
Nearly level phase	PB	20	40	13	24	25	45	.5	1.5	0	2.5	-----	40	

See footnotes at end of table.

TABLE 2.—*Soils of Jasper County, Mo.. Average per acre yields to be expected over a period of years and relative suitability for forest*—Continued

[Yields in columns A are obtained under ordinary management; those in columns B, under good management; blank spaces indicate yield data are lacking]

Soil	Map symbol	Corn		Wheat		Oats		Lespedeza hay		Alfalfa hay		Brush-cleared pasture (cow-acre-days)[1]		Forest
		A	B	A	B	A	B	A	B	A	B	A	B	
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*			
Parsons silt loam:														
Level phase	Pc	15	35	13	24	20	40	0.5	1.5	0	([2])	-----	35	
Nearly level phase	Pd	20	40	13	24	25	45	.5	1.5	0	2.5	-----	40	
Riverton gravelly loam, gently sloping phase.	Ra	20	45	15	20	20	40	.5	1.0	0	2.0	-----	40	
Robertsville silt loam	Rb	15	35	8	18	15	25	.7	1.0	0	0	20	40	Do.
Steep stony land:														
Baxter soil material	Sa	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	17	23	Good.
Bodine soil material	Sb	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	10	15	Poor.
Strip mines	Sc	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0	15	Poor.
Taft silt loam	Ta	25	50	15	26	25	40	1.0	2.0	0	3.5	17	60	Good.
Verdigris fine sandy loam	Va	35	50	15	25	25	40	1.5	2.0	2.0	3.0	17	60	Do.
High-bottom phase	Vb	35	55	15	25	30	45	1.5	2.0	2.0	3.0	17	60	Do.
Woodson silty clay loam, nearly level phase.	Wa	30	50	-----	-----	30	40	2.0	2.0	([2])	([2])	-----	80	

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[1] Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days that animals can be grazed without injury to pasture; for example, a soil that supports 1 animal unit per acre for 360 days rates 360; a soil supporting 1 animal unit on 2 acres for 180 days rates 90; and a soil supporting 1 animal uni on 4 acres for 100 days rates 25.

[2] Crop probably will not do well on the soil.

SOIL SERIES AND THEIR RELATIONS

The soil series of Jasper County are grouped according to similar soil characteristics as follows:

1. Soils with stone, gravel, or chert:
   - Moderately dark soils:
     - Collinsville.
     - Craig.
     - Eldon.
     - Riverton.
     - Melvern.
     - Eldorado.
   - Brown or reddish-brown soils:
     - Baxter.
     - Cumberland (gravelly).
     - Huntington (gravelly).
     - Newtonia (cherty).
   - Light-colored soils:
     - Bodine.
     - Boone.
     - Nixa.
2. Nonstony soils with a permeable subsoil:
   - Moderately dark soils:
     - Bates.
     - Dennis.
     - Labette.
   - Brown or reddish-brown soils:
     - Cumberland (silt loam).
     - Elk.
     - Newtonia (silt loam).
     - Huntington (silt loam).
     - Verdigris.
   - Light-colored soils:
     - Cabanal.
     - Lindside.
     - Taft.
3. Nonstony soils with a dense clay subsoil:
   - Grayish-brown to dark-gray soils:
     - Carytown.
     - Cherokee.
     - Dunning.
     - Gerald.
     - Inola.
     - Neosho.
     - Parsons.
     - Woodson.
   - Very light-colored soils:
     - Connor.
     - Lightning.
     - Melvin.
     - Robertsville.

SOILS WITH STONE, GRAVEL, OR CHERT

The soils with stone, gravel, or chert (group 1) are placed in three subgroups. All soils of the first subgroup, the moderately dark soils, owe their color to the prairie vegetation under which they developed. The Collinsville soils are developed from sandstones; the Melvern and Riverton, from rounded chert gravel; and the Craig, Eldon, and Eldorado from cherty limestone residuum. All soils of the second subgroup, the brown or reddish brown soils, are developed from limestone residuum, and they retain the reddish color of their parent material. The light-colored soils of the third subgroup reflect the influence of the forest vegetation under which they developed. The Boone soils developed from sandstone, and those of the other two series—the Bodine and Nixa—are from cherty limestone residuum.

Considering the soils of group 1 as a whole, they are open and permeable and tend to be droughty. All of the Collinsville, Melvern, Boone, Eldorado, and Bodine soils and the stony members of the Baxter series are so shallow and stony as to be generally unsuited to cultivation. The Bodine, Boone, and stony Baxter soils are best suited to forest or pasture.

The general location of larger areas of stony Boone and Bodine soils is shown in figure 4.

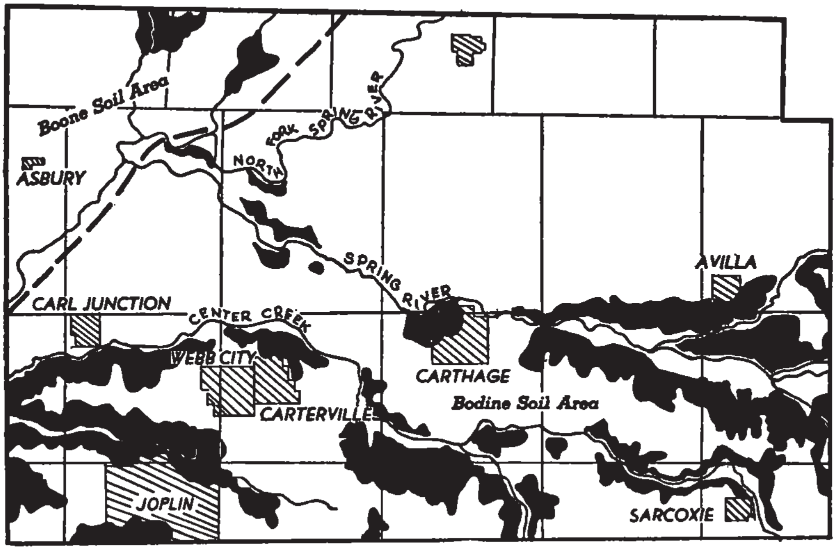

FIGURE 4.—Location of stony forested soils in Jasper County, Mo., indicated by dark areas.

The Collinsville, Melvern, Eldorado, and Boone soils are used principally for pasture. The Nixa soil is marginal for crop production. The stone content of Nixa soil is not so high as to preclude cultivation, but fertility is low, and only a part of the soil is cultivated.

The remaining soils contain a considerable quantity of fine material and are used for general farming. They are as follows:

- Craig cherty silt loam, gently sloping phase.
- Eldon silt loam, nearly level phase.
- Eldon cherty silt loam, gently sloping phase.
- Riverton gravelly loam, gently sloping phase.
- Baxter cherty silt loam:
    - Gently sloping phase.
    - Sloping phase.
- Cumberland gravelly silt loam.
- Huntington gravelly silt loam.
- Newtonia cherty silt loam:
    - Gently sloping phase.
    - Sloping phase.

NONSTONY SOILS WITH A PERMEABLE SUBSOIL

The nonstony soils with a permeable subsoil (group 2) have a medium-textured surface soil and are relatively free of stone. They occur on level to gently sloping topography and are the best general-purpose croplands in the county. The soils of group 2 are placed in three subgroups.

The first subgroup, the moderately dark soils, is made up of soils that are somewhat higher in content of organic matter than other soils of group 2. The soil of the Bates series, developed on sandstone, is less productive than either the Dennis or Labette soils.

The second subgroup is made up of brown or reddish-brown soils. The Cumberland, Elk, Huntington, and Newtonia soils occur in limestone areas, and the Verdigris soils in the sandstone and shale areas. The Cumberland and Elk soils are on terraces; the Huntington, on bottom lands; the Newtonia, on nearly level to sloping uplands; and the Verdigris, on better drained bottom lands. All the soils of the second subgroup are at least moderately productive. The soils of the bottom lands are subject to overflow. Those of the uplands and terraces are low in organic matter, but with good management they can be maintained at a high state of productivity.

The soils of the third subgroup—the Cabanal, Lindside, and Taft—are intermediate in their properties. They are lighter colored and have a heavier subsoil than the moderately dark or the brown or reddish-brown soils of group 2, but do not have a subsoil so heavy as that common to nonstony soils with a dense clay subsoil (group 3). The Lindside soils are grayish-brown moderately well drained associates of the Huntington soils in the bottom lands. The Cabanal soil occupies well drained terrace positions in the sandstone and shale areas. The Taft soil is a gray, imperfectly drained associate of Cumberland and Elk soils.

NONSTONY SOILS WITH A DENSE CLAY SUBSOIL

All of the nonstony soils with a dense clay subsoil (group 3) occur on nearly level topography. With the exception of the Dunning and Woodson, all have a silt loam surface soil, usually 8 to 16 inches thick, that rests directly on the dense clay subsoil. Most of the soils have a light-gray subsurface layer. The soils of group 3 are placed in two subgroups.

The first subgroup is made up of grayish-brown to very dark-gray soils. The Gerald soils, developed in the limestone area, are somewhat more productive than the Parsons and Cherokee, which developed in the areas of sandstone and shale exposure. The general location of larger areas of Gerald, Parsons, and Cherokee soils is shown in figure 5. The Inola soils, developed over rounded chert gravel, are about equal to the Parsons soils in productivity. The Dunning and Woodson soils are darker than others of group 3 and have more clay in the surface layer and a less compacted clay subsoil. The Dunning soils occupy bottom lands; the Woodson, poorly drained areas on lower slopes bordering the bottom lands. The Carytown soil occurs in association with the Woodson, but is lighter colored and has a heavier, more compacted subsoil. Some corn is grown on Dunning, Woodson, and Carytown soils, but they are best suited to small-grain, meadow, and pasture crops. The Neosho soil occupies level terraces along streams that drain sandstone and shale areas.

In the second subgroup are very light-colored soils—the Connor, Lightning, Melvin, and Robertsville. All of these have a light-gray silt loam surface layer and a dense clay subsoil. The Melvin and Lightning soils occupy poorly drained areas in the bottoms; and the Connor and Robertsville, corresponding positions on the terraces. The Melvin and Robertsville soils occur in the area of limestone residuum, whereas the Connor and Lightning are in the area of sandstone- and shale-derived upland soils.

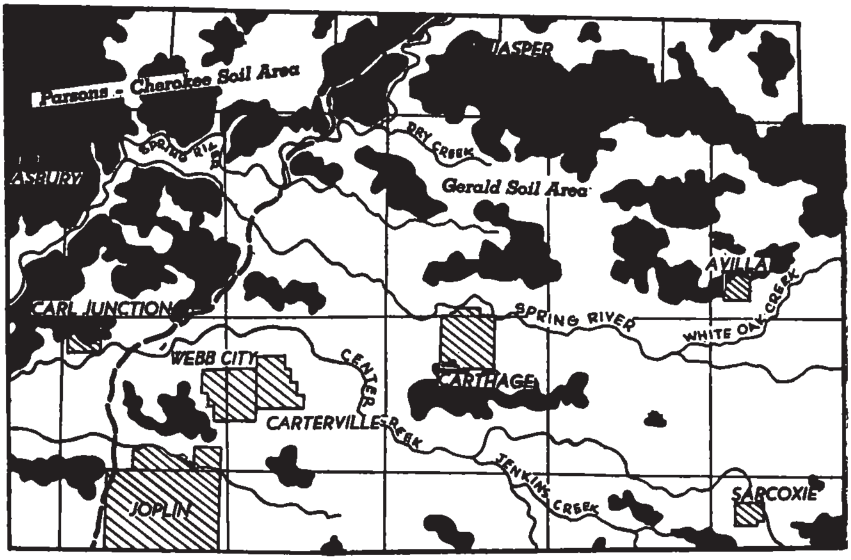

FIGURE 5.—Location of prairie claypan soils in Jasper County, Mo., indicated by dark areas.

SOIL TYPES AND PHASES

In the following pages the soils of the county are described in detail, and their agricultural relations are discussed. Their location and distribution are shown on the accompanying soil map, and their acreage and proportionate extent are given in table 3. The soils are arranged in alphabetical order by type name to facilitate reference.

TABLE 3.—*Acreage and proportionate extent of the soils in Jasper County, Mo.*

Soil	Acres	Percent
Bates fine sandy loam, gently sloping phase	7,746	1.9
Baxter cherty silt loam:		
Gently sloping phase	6,658	1.6
Sloping phase	1,617	.4
Baxter stony silt loam:		
Gently sloping phase	1,141	.3
Sloping phase	4,722	1.2
Bodine stony silt loam:		
Gently sloping phase	17,386	4.3
Moderately steep phase	23,412	5.8
Boone fine sandy loam:		
Gently sloping phase	1,160	.3
Sloping phase	405	.1
Boone stony fine sandy loam, moderately steep phase	611	.2
Cabanal loamy fine sand, gently sloping phase	2,625	.6
Carytown silt loam	12,438	3.1
Chat piles	8,419	2.1
Cherokee silt loam	4,134	1.0
Collinsville fine sandy loam:		
Gently sloping phase	1,970	.5
Sloping phase	2,008	.5

TABLE 3.—*Acreage and proportionate extent of the soils in Jasper County, Mo.*—Continued

Soil	Acres	Percent
Collinsville stony fine sandy loam, sloping phase	1, 066	. 3
Connor silt loam	1, 147	. 3
Craig cherty silt loam, gently sloping phase	2, 743	. 7
Cumberland gravelly silt loam	651	. 2
Cumberland silt loam	734	. 2
Dennis silt loam, gently sloping phase	2, 568	. 6
Dunning silt loam	9, 787	2. 4
Dunning silty clay loam	2, 707	. 7
Eldon cherty silt loam:		
Gently sloping phase	25, 652	6. 2
Nearly level phase	1, 385	. 3
Eldon silt loam:		
Gently sloping phase	6, 895	1. 7
Nearly level phase	2, 681	. 7
Eldorado stony silt loam:		
Gently sloping phase	8, 298	2. 0
Sloping phase	5, 701	1. 4
Elk silt loam	2, 636	. 6
Gerald silt loam:		
Depressional phase	2, 373	. 6
Level deep phase	8, 391	2. 1
Level phase	18, 757	4. 6
Level shallow phase	775	. 2
Nearly level deep phase	4, 246	1. 0
Nearly level phase	20, 472	5. 0
Nearly level shallow phase	3, 595	. 9
Huntington gravelly silt loam	1, 633	. 4
Huntington silt loam	11, 880	2. 9
Dark phase	2, 310	. 6
High-bottom phase	2, 644	. 7
Inola silt loam:		
Level phase	7, 196	1. 8
Nearly level phase	10, 525	2. 6
Labette silt loam:		
Gently sloping phase	7, 477	1. 8
Nearly level phase	13, 304	3. 3
Lightning silt loam	2, 020	. 5
Lindside and Huntington soils	8, 152	2. 0
Lindside silt loam	6, 798	1. 7
High-bottom phase	1, 888	. 5
Melvern gravelly loam, gently sloping phase	4, 465	1. 1
Melvin silt loam	876	. 2
Neosho silt loam	1, 624	. 4
Newtonia cherty silt loam:		
Gently sloping phase	13, 139	3. 2
Sloping phase	294	. 1
Newtonia silt loam:		
Gently sloping phase	3, 550	. 9
Nearly level phase	6, 862	1. 7
Nixa cherty silt loam, gently sloping phase	19, 870	4. 9
Parsons loam:		
Level phase	973	. 2
Nearly level phase	4, 409	1. 1
Parsons silt loam:		
Level phase	11, 344	2. 8
Nearly level phase	9, 098	2. 2
Riverton gravelly loam, gently sloping phase	1, 118	. 3
Robertsville silt loam	371	. 1
Steep stony land:		
Baxter soil material	829	. 2
Bodine soil material	2, 234	. 6
Strip mines	117	(1)
Taft silt loam	3, 339	. 8
Verdigris fine sandy loam	6, 070	1. 5
High-bottom phase	966	. 2
Woodson silty clay loam, nearly level phase	8, 673	2. 1
Total	405, 760	100. 0

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[1] Less than 0.1 percent.

Bates fine sandy loam, gently sloping phase (2%–6% slopes) (BA).—This soil has a grayish-brown fine sandy loam surface layer and a brown clay loam subsoil. It developed under grass vegetation on gently sloping topography from noncalcareous sandstone, and it is underlain by partly disintegrated sandstone at an average depth of 40 inches. Drainage is uniformly good. The subsoil is retentive of moisture but permeable to roots and air.

The soil occurs in the northwestern part of the county in the region of Collinsville, Parsons, and Cherokee soils. It differs principally from the Collinsville soils in having (1) a depth of more than 30 inches to sandstone and (2) distinct clay loam subsoil layers. In contrast, Collinsville soils are less than 30 inches deep and have subsoil layers that are only faintly developed or absent. The Bates soil differs from Parsons soils in having a permeable friable clay loam subsoil. It also lacks the gray subsurface horizon found in these soils. It is deeper and darker than Boone soils. It is similar in appearance to Labette, Dennis, Craig, and Riverton soils, but it differs from them in having a fine sandy loam surface soil and in being underlain by sandstone.

Profile description:

0 to 10 inches, grayish-brown, very friable, very sandy loam of weakly developed fine granular structure; organic content moderately low but not so low as in the forested soils developed on sandstone.

10 to 14 inches, a zone of transition between the surface and subsoil; pale-brown fine sandy loam that grades with depth to a brown loam or clay loam; layer friable and of well-developed granular structure.

14 to 24 inches, brown or pale-brown sandy clay loam mottled with reddish-brown; slightly hard to hard; breaks into small rounded aggregates on drying.

24 to 40 inches, yellowish-brown, mottled with reddish-brown and yellowish-red, friable sandy clay loam.

40 inches +, light yellowish-brown, partly distintegated, fine-grained noncalcareous, thin-bedded, and weakly cemented sandstone composed mostly of quartz sand but containing some mica.

The entire profile is acid. The soil varies somewhat from the profile just described. The depth to sandstone varies from about 20 to 50 inches or more and is least on steeper slopes. The subsoil is thin on steeper slopes but heavier and thicker on more level areas.

Use and management.[4]—Bates fine sandy loam, gently sloping phase, originally had a prairie-grass cover composed predominantly of big and little bluestem. About 10 to 15 percent of the soil has never been broken out, and the native grasses on this part are used for pasture and hay. Another 15 percent has been plowed but is now used for permanent pasture. Small grains and row crops are about equally extensive on the cultivated land. Wheat is the dominant small-grain crop; the acreage in corn and sorghum crops is about equally divided. Lespedeza [5] is grown, but the acreage is not large.

Systematic crop rotations are seldom followed. The soil is moderately productive when first cultivated, but under prolonged cultivation it deteriorates more rapidly than most of the other grassland soils. The organic matter supply is low and is rapidly lost under cultivation. Most areas are on slopes of about 3 to 5 percent, and under continued cultivation erosion occurs.

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[4] Use and management are described in this report as they existed at the time of survey (1942). For current information, see your county Agricultural Agent.

[5] In this report, "lespedeza" means "Korean lespedeza."

An application of 3–12–12[6] or a similar commercial fertilizer is frequently used on grains. Yields of wheat range from 9 to 18 bushels, and average about 12 bushels an acre under ordinary management. Under best management, corn yields of 60 or more bushels per acre are obtained, but the prevailing average is not more than 20 bushels.

Bates fine sandy loam, gently sloping phase, is easy to plow but is low in fertility and subject to erosion. Lime and a fertilizer high in content of phosphorus should be used regularly. Clean-tilled crops should not be used more frequently than 1 year in 4, and they should be planted on the contour. Terraces may be used effectively to control erosion on cultivated fields. Under proper management hay yields of 1 to 1½ tons of lespedeza or lespedeza-clover-grass mixture an acre should be obtainable. Alfalfa hay yields 2 to 3 tons an acre when liberal soil treatments are used.

Baxter cherty silt loam, gently sloping phase (2%–6% slopes) (Bb).—This brown soil developed from cherty limestone under forest vegetation. Like the other Baxter soils, it is among the most productive upland forest soils in this county. The occurrence of chert is variable. Some areas are chert-free, and others are so stony as to be nonarable. Drainage is uniformly good. All of the soil was originally forested and supported a vigorous growth of white and red oaks, various hickories, walnut, and some ash, hackberry, hard maple, and elm.

Small scattered areas occur throughout most of the southern half of the county, but the soil is most extensive near the Lawrence County line in the vicinity of Larussell. It has gently sloping topography, occurs along major streams, and is associated with both the lighter colored Bodine and the darker colored cherty Newtonia soils.

Profile description:

0 to 8 inches, light-brown very friable cherty silt loam, the chert making up 15 to 50 percent of the soil mass; chert fragments are less than 3 inches in diameter, rough surfaced, and similar to the soil in color; weak fine granular soil structure.

8 to 18 inches, pale-brown friable cherty silt loam in upper part of layer is similar in appearance to layer above but it grades with depth into brown or reddish-brown friable cherty silty clay loam of uniform color.

18 inches +, mass of broken chert with reddish-brown silty clay between the fragments; bedrock occasionally at 3 feet but generally at 10 to 15 feet below the surface.

To a short distance above bedrock the soil is acid. There are wide variations in the chert content of small areas, and the depth to the broken mass of chert also varies greatly. In some places chert may be several feet beneath the surface and in others not more than 12 inches.

Use and management.—At present probably 10 percent of Baxter cherty silt loam, gently sloping phase, is forested; 50 percent is in permanent or in rotated pasture; and 40 percent is cultivated. The cultivated land is used mostly for small grains and hay. Lespedeza is grown extensively for both pasture and hay. Wheat yields (with fertilizer) average about 13 bushels an acre. If the soil is limed and fertilized, alfalfa can be successfully grown, but the present acreage of that crop is not large. Some red clover is grown.

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[6] Percentages of nitrogen, phosphorus, and potassium, respectively.

The soil is best suited to and is now used mostly for the pasture-small grain-hay type of farming. It is a moderately fertile soil and easily worked in all except the very cherty areas. Erosion is slight except on sloping cultivated fields.

Baxter cherty silt loam, sloping phase (6%–12% slopes) (Bc).—The profile of this phase is similar to that of the gently sloping phase, but the stone content of the surface soil averages slightly higher, and the depth to bedrock is less. Probably 80 percent of the land is forested or in pasture. Small grains and hay are grown almost exclusively on the cultivated areas, and yields are about the same as on the gently sloping phase.

Baxter stony silt loam, gently sloping phase (2%–6% slopes) (Bd).—The profile of this soil is essentially the same as that for the Baxter cherty silt loam soils, but it differs in having more and larger chert fragments in the surface soil. Stones 4 to 8 inches in diameter are abundant. As much as 70 percent of the soil mass may be composed of stones.

Use and management.—Because of the high stone content, nearly all of Baxter stony silt loam, gently sloping phase, is used for pasture. Approximately 25 percent is forested, and the forest species are the same as those on Baxter cherty silt loam. Lespedeza, which has been introduced into many of the pastures, makes a good growth and is sometimes cut for hay. A few small fields are cultivated, and these are used for small grain or hay. Formerly, commercial strawberry plantings were made on this soil, but the acreage so used was never large.

Baxter stony silt loam, sloping phase (6%–18% slopes) (Be).—In profile characteristics this soil is similar to the gently sloping phase. Like the latter, it is used almost exclusively for pasture or production of timber. Probably 40 percent of the land is at least partly forested, and nearly all forested areas are pastured.

Bodine stony silt loam, gently sloping phase (1%–6% slopes) (Bf).—This soil occupies gently sloping areas on narrow ridge tops and has developed from cherty limestone residuum similar to the parent material of the Baxter soils but of lighter color. Like the moderately steep phase next described, the gently sloping phase of Bodine stony silt loam (pl. 1, *A* and *B*) occurs throughout the southern half but is most extensive in the southern one-fourth of the county.

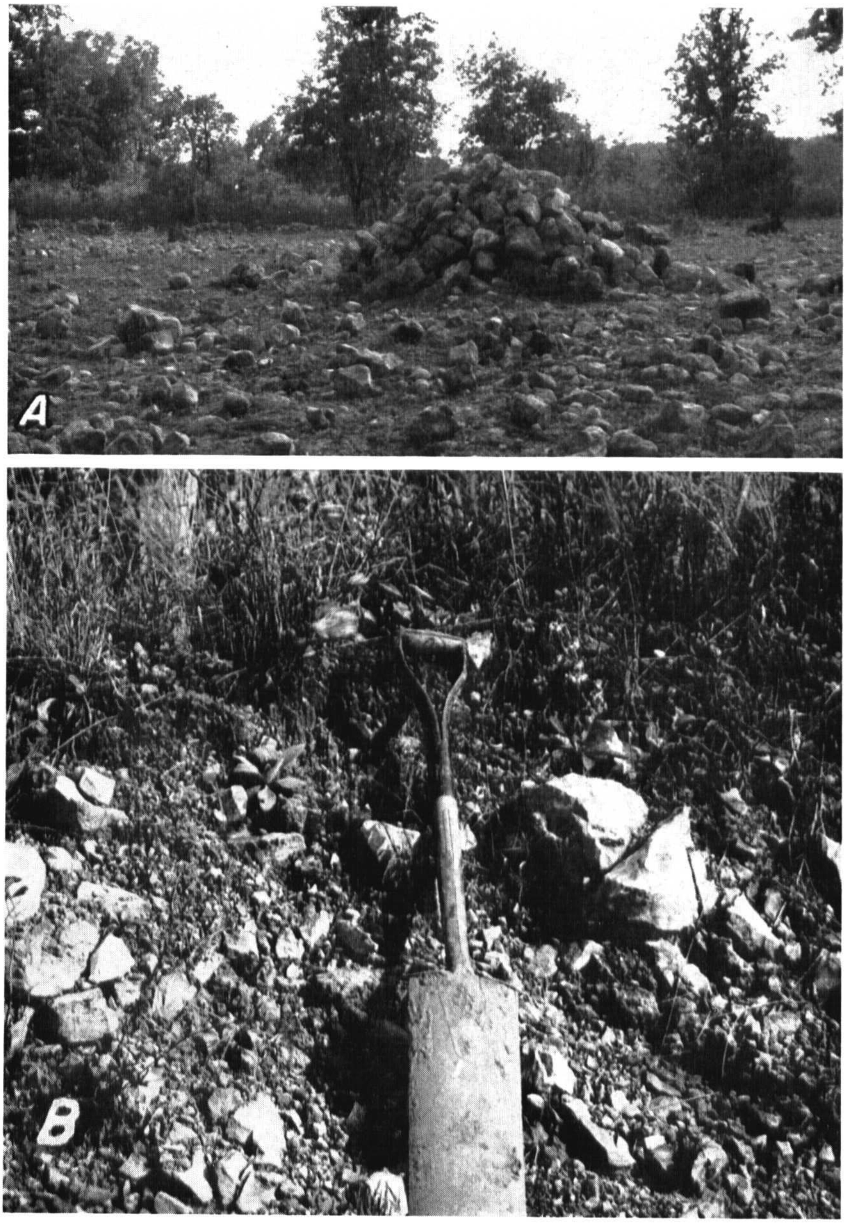
Drainage is good to excessive, but because of the silt and high stone content of the soil material, the water-holding capacity is low. White oak is the dominant tree, and for that reason the soil is known locally as white-oak land.

Profile description:

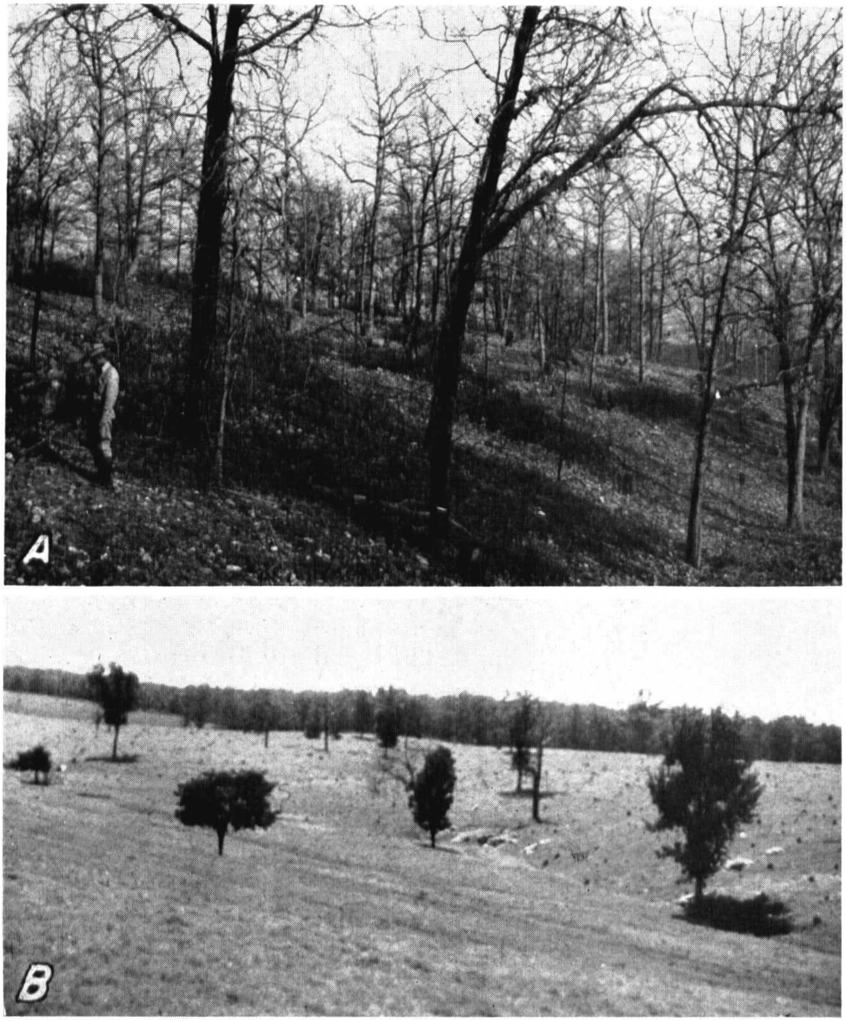
0 to 1½ inches, light brownish-gray loose stony silt loam under forest vegetation; this horizon disappears when the land is cultivated or eroded.

1½ to 8 inches, very pale-brown to yellow floury stony silt loam containing porous chert fragments 10 inches or less in diameter; stone content variable but in most places about 40 percent of the surface soil mass.

8 to 14 inches, very pale-brown stony silt loam to silty clay loam containing more and larger stones than the layer above; fine material of coarse granular structure.



A, Small cultivated field on Bodine stony silt loam, gently sloping phase. Because of stoniness and shallowness, little of this phase is cultivated.
B, Profile of Bodine stony silt loam, gently sloping phase: Pale-yellow silt loam mixed with a mass of chert fragments.



A, Oak forest on Bodine stony silt loam, moderately steep phase. Like many forests in the county, this one has been repeatedly burned and cut over and now suports little marketable timber and little pasture.

B, Pasture of fair quality on an area of Bodine stony silt loam, moderately steep phase, cleared of forest.

14 to 40 inches, a mass of broken chert with yellow silt loam or silty clay loam in the crevices.
40 inches +, brown or reddish-brown silty clay in crevices of the chert mass; chert fragments apparently less weathered; depth to bedrock variable but usually 5 to 15 feet.

The profile is acid throughout. The stone content is high, and the clay content of the soil material is low. Most of the tree and plant roots are confined to the upper 30 inches of the profile. Although the soil does not have any very distinct layers, it is highly leached. It is low in organic matter and in the various minerals needed for plant growth. In some of the gently sloping areas the subsoil has almost as much clay as the Nixa subsoil. The surface soil in these places, however, is more stony than that of the Nixa.

Use and management.—Probably 75 percent of the land is forested. Most of the areas cleared are used for pasture. About 15 to 20 acres of woodland is required to pasture a mature animal, whereas an equal amount of forage is produced on about 5 to 8 acres of cleared land. Considering its many unfavorable features—high stone content, low supply of organic matter, low fertility, low clay content, and low moisture-holding capacity—Bodine stony silt loam, gently sloping phase, is surprisingly productive. When the ground is cleared, fairly good pastures can be established. The principal pasture vegetation is hop clover, common lespedeza, Korean lespedeza, crabgrass, and a wild bunchgrass. During droughts pasture plants make little growth, and many are killed if drought is extended. Pasture growth is good in wet seasons.

A few small fields of gently sloping soil, none of them more than a few acres in size, are cultivated. These fields are used chiefly for strawberries, tomatoes, and other garden crops.

Bodine stony silt loam, moderately steep phase (8%–20% slopes) (BG).—This soil occurs on steeper slopes bordering the larger streams, but its profile is essentially the same as that described for the gently sloping phase. Use of the soil is also much the same, except that the percentage cleared of forest is a little lower. Practically all of this land is used for forest or pasture (pl. 2, *A* and *B*).

Boone fine sandy loam, gently sloping phase (1%–6% slopes) (BH).—This soil, like the other Boone soils, is light colored, shallow, and sandy. It occurs on narrow ridge tops in the northwestern part of the county and is derived from noncalcareous sandstone. It is associated with Boone fine sandy loam, sloping phase, and Boone stony fine sandy loam, moderately steep phase, both of which occupy more strongly sloping positions. This and the other Boone soils occur in the same general area as the Bates and Collinsville, but they are lighter colored.

Profile description of Boone fine sandy loam, gently sloping phase:

0 to 6 inches, pale-brown soft fine sandy loam with a weakly developed fine granular structure.
6 to 14 inches, light yellowish-brown friable fine sandy loam or loam; medium-sized structure granules easily crushed.
14 inches +, partly disintegrated yellowish-brown noncalcareous sandstone.

The entire profile is acid. Included with this phase are a few small areas with 10 to 12 inches of surface soil and a heavier subsoil. Depth to bedrock varies from 12 to 26 inches.

Use and management.—About 20 percent of the gently sloping phase of Boone fine sandy loam is cultivated, another 20 percent is in permanent pasture, and the remaining 60 percent is forested. Most of the forested areas are pastured. Several cleared areas have been reforested. Most of the land now cultivated is in fields of less than 20 acres. Corn, sorghums, cowpeas, and small grains are the principal crops. Yields are low. Corn averages less than 20 bushels an acre. Most of the small grains are cut for hay, and the sorghums are used for forage.

This easily tilled soil is on topography suitable for cultivation. It is low in organic matter, fertility, and water-holding capacity. It is the best cropland in the area of timbered soils derived from sandstone. Many of the farms in this area are small, and this soil is the best of those on the farms.

Erosion is a problem on the cultivated fields but could be controlled by contour tillage and by reducing the frequency of clean-tilled crops. The soil mantle is so shallow that terraces are not recommended. Building a terrace large enough to be effective would expose the bedrock in the terrace channels. Yields would be increased by additions of lime and fertilizer, but they would be low even under the best management. The pasture lands are droughty and do not support a very high quality of forage. Lespedeza makes only a fair growth but is grown for pasture and hay.

Boone fine sandy loam, sloping phase (6%–10% slopes) (Bk).—This soil occurs in the same general area as the gently sloping phase of Boone fine sandy loam, and its characteristics are similar. Not more than 10 percent of the soil is cultivated. Areas in cultivation are used in about the same way as the more gently sloping ridges of Boone soil, and the rest is in pasture or timber. Most of the forested area is pastured. This phase is best suited to pasture and forest. Lespedeza and redtop are the principal pasture plants.

Boone stony fine sandy loam, moderately steep phase (8%–20% slopes) (Bl).—The steeper slopes in the same general area as Boone fine sandy loam, sloping phase, are occupied by this soil. Although dominantly of 8 to 20 percent, slopes range from about 4 to 25 percent. The forest consists almost entirely of oaks, the post and blackjack species predominating.

The surface soil, 4 to 8 inches deep, is a pale-brown stony fine sandy loam. The stones—pale-brown or light yellowish-brown sandstone fragments as large as 12 inches in diameter—are scattered in places over the soil and may occupy 40 percent of the surface area. Below a depth of 6 to 12 inches the subsoil grades through yellowish-brown stony friable fine sandy loam into partly disintegrated sandstone.

Use and management.—At least 80 percent of Boone stony fine sandy loam, moderately steep phase, is forested. Both the cleared and forested land is in pasture. About 15 to 20 acres of forested land is required to support a mature animal through the pasture season, but when cleared the land has about the same carrying capacity as Boone fine sandy loam, gently sloping phase.

Cabanal loamy fine sand, gently sloping phase (1%–5% slopes) (Ca).—This light-colored moderately well-drained sandy soil has developed from old gravelly alluvial material of mixed origin. Sandstone and cherty material washed from uplands are important constituents. The soil is not extensive in this county; it is confined to small areas along the North Fork Spring River and along Spring River below its junction with the North Fork. It occupies gently sloping areas on terraces; the more level areas are occupied by Connor silt loam. The Cabanal soil was formed under forest vegetation. Included, however, are some sloping areas bordering the Neosho soil that probably developed under grass.

Profile description:

0 to 18 inches, pale-brown loamy fine sand with a weakly defined fine granular structure.
18 to 24 inches, brown or yellowish-brown slightly hard clay loam with a moderately well defined nutlike structure.
24 to 40 inches, yellowish brown friable clay loam.

The entire profile is strongly acid. Included with this soil are a few small areas having a fine sandy loam surface texture and a shallower surface soil. A few small sloping terrace areas bordering level Neosho soil are also included.

Use and management.—Cabanal loamy fine sand, gently sloping phase, usually does not occur in large enough areas to be used separately, and its use is therefore determined by the soils with which it is associated. Where it is associated with Connor silt loam, both soils are mostly forested or in pasture. Where it is associated with the Neosho soil, it is pastured or cultivated. Probably not more than 15 percent of the Cabanal soil is cultivated; the areas are used for small grains, sorghums, or corn.

The fertility is low, but drainage and moisture-holding capacity are favorable for plant growth. The soil would respond to treatment, and if it occupied continuous areas large enough to be farmed separately, might be utilized more intensively. Because of the unresponsive soils with which it is associated, this soil probably will be and should be utilized principally for pasture.

Carytown silt loam (0%–2% slopes) (Cb).—This soil, locally known as claypan land, has a gray silt loam surface layer and dense dark clay subsoil. It is extensive in shallow depressional areas throughout the northeastern and north central parts of the county, and smaller areas occur in the southeastern part. It is associated with the deep phases of Gerald silt loam and with Eldon and Labette soils. In larger depressions it is closely intermingled with Woodson silty clay loam, nearly level phase.

Nearly all areas of Carytown silt loam receive seep water and, in some places, runoff water from higher gentle slopes. Surface drainage is fair, but internal drainage is slow. The soil is low in organic-matter content.

Profile description:

0 to 8 inches, light brownish-gray friable acid silt loam with a poorly defined granular structure.
8 to 12 inches, light-gray or light brownish-gray acid silt loam with a coarse granular structure; structure particles easily crushed.
12 to 24 inches, very hard silty clay that breaks into hard aggregates ¼ to 1 inch in diameter; aggregates coated with a dark-gray film but yellowish brown when crushed; reaction, nearly neutral.
24 to 34 inches, light yellowish-brown hard silty clay that breaks into small firm granules upon drying; reaction, alkaline.

34 to 50 inches, light yellowish-brown hard silty clay that is similar in appearance to the 24- to 34-inch layer but commonly contains lime concretions and gypsum crystals.

The depth of the surface soil is variable. In some places, only 5 or 6 inches of brownish-gray silt loam overlies the heavy subsoil; in others, the silt loam layer may be 14 to 16 inches thick. The lighter colored subsurface horizon, or gray layer, is much more distinct in areas having deeper surface soil. This difference in depth of surface material does not appear to be the result of erosion. The depth of the surface soil may range from 6 to 14 inches in a small area. The depth to concretions is also variable, but lime concretions and gypsum crystals usually occur within 26 to 38 inches of the surface. See plate 3, *A*, for a profile of this soil.

Use and management.—About 50 percent of the soil is in pasture. Lespedeza, cowpeas (pl. 3, *B*), soybeans, and grain sorghums, the principal crops, do fairly well. A limited acreage of corn and wheat is grown, but yields are usually low. Because most areas are saturated for long periods in the winter and in spring, they are not well suited to crops sensitive to excessive moisture or frost.

The subsoil is exceedingly dense, and penetration with ordinary tillage implements is virtually impossible. Penetration by plant roots is also restricted. Tillage is confined to the shallow surface soil.

Chat piles (Variable slopes) (Cc).—Throughout the zinc- and lead-mining area are extensive tracts that have been destroyed for agricultural purposes by mining operations. These waste areas are composed of chat piles, tailing piles, sump ponds, mine shafts, and mill sites. The chat piles are mounds as much as 100 feet high. Individual chat piles seldom cover more than 20 acres, but joining or overlapping piles cover most of the land surface over several square miles. The chat piles are composed mostly of finely broken chert and limestone and may include shale and sandstone.

On some of the older chat piles a few plants such as sweetclover, ragweed, and mullein have become established in the more protected coves on the mounds. A few small cottonwood and willow trees grow near the base of the mounds. Most of these mounds are, however, completely devoid of vegetation.

Cherokee silt loam (0%–1% slopes) (Cd).—This gray soil with a heavy claypan subsoil occupies about 6 square miles on the broad level prairie in the northwestern corner of the county. It is associated with the grayish-brown Parsons soils.

Profile description of Cherokee silt loam:

0 to 7 inches, gray to light brownish-gray very friable silt loam with a weakly developed fine granular structure.

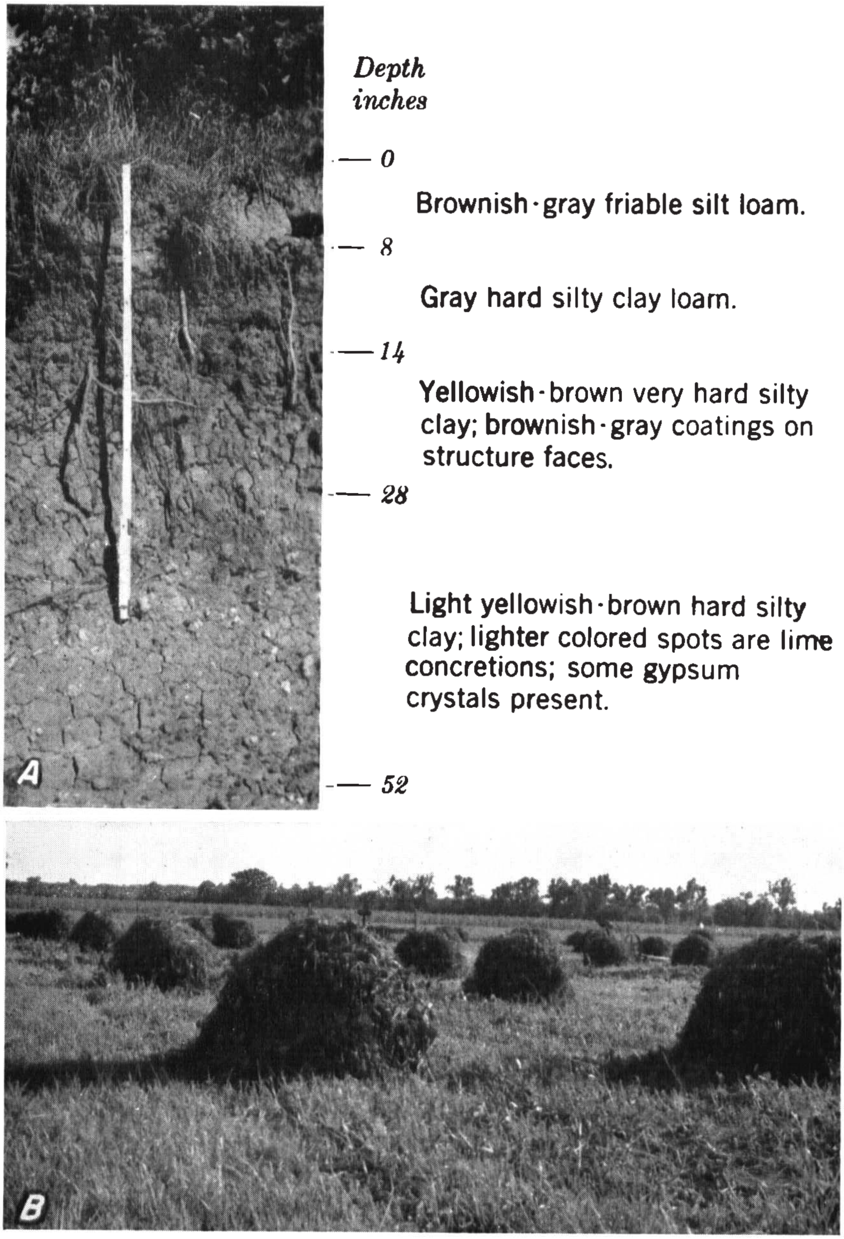
7 to 15 inches, light-gray friable silt loam with a weakly defined platy structure.

15 to 26 inches, olive-gray and grayish-brown mottled dense very hard clay that breaks into blocky fragments ½ to 1 inch in diameter on drying.

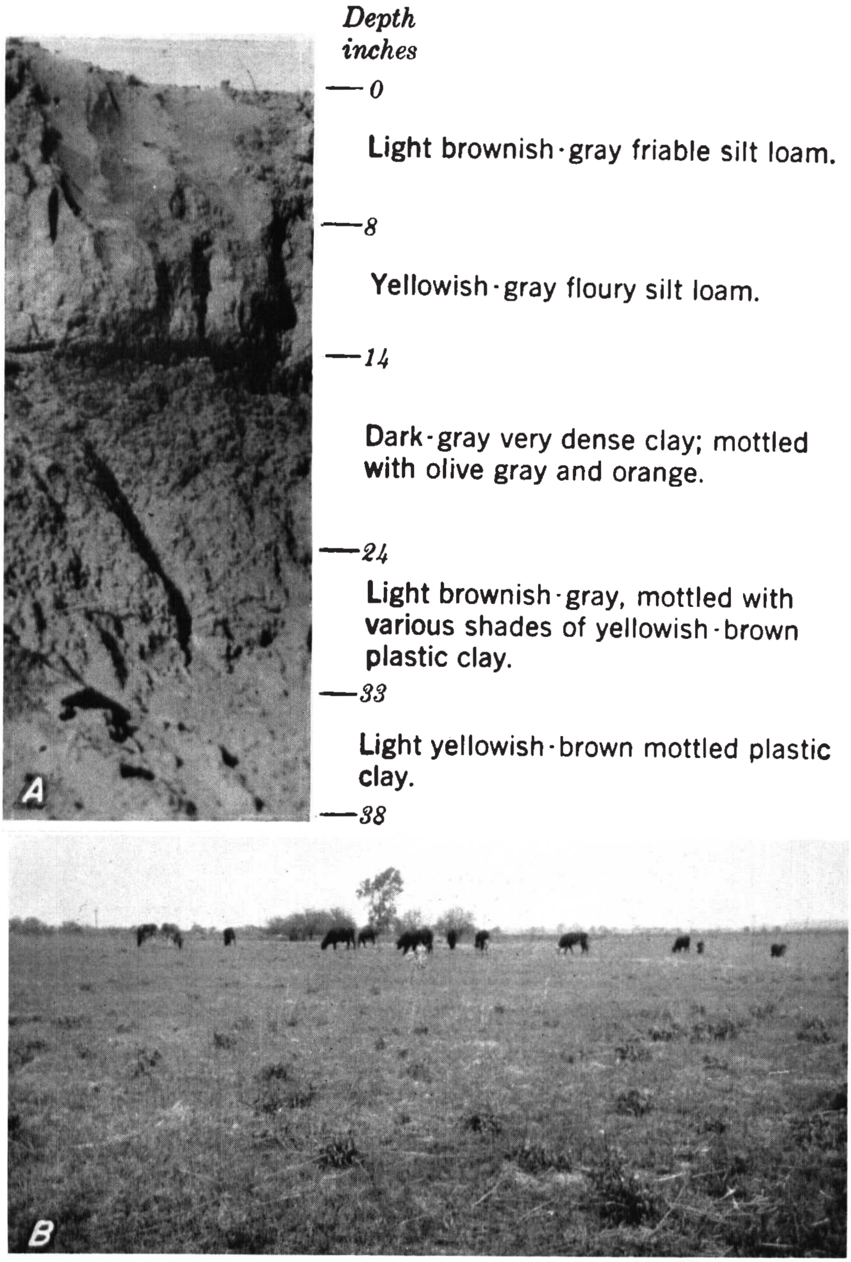
26 to 40 inches, yellowish-brown and grayish-brown stiff, massive clay.

The entire profile is strongly acid. A profile of this soil is shown in plate 4, *A*.

Use and management.—Approximately 85 to 90 percent of Cherokee silt loam has never been plowed and is used for hay or pasture.


Depth inches
0
Brownish-gray friable silt loam.
8
Gray hard silty clay loam.
14
Yellowish-brown very hard silty clay; brownish-gray coatings on structure faces.
28
Light yellowish-brown hard silty clay; lighter colored spots are lime concretions; some gypsum crystals present.
52
A
B

A, Profile of Carytown silt loam.
B, Cowpeas on a typical broad nearly level area of Carytown silt loam.


Depth inches
—0
Light brownish-gray friable silt loam.
—8
Yellowish-gray floury silt loam.
—14
Dark-gray very dense clay; mottled with olive gray and orange.
—24
Light brownish-gray, mottled with various shades of yellowish-brown plastic clay.
—33
Light yellowish-brown mottled plastic clay.
—38
A
B

A, Profile of Cherokee silt loam.
B, Overgrazing and low fertility account for the poor grass cover on this level area of Cherokee silt loam.

Little bluestem is the dominant grass (pl. 4, *B*). The hay is cut and baled during July and August. Yields average a little less than a ton of hay an acre.

The cultivated land is used for sorghums and small grains. Yields average lower than on the Parsons soils. Because of low fertility, poor drainage, and poor physical properties, Cherokee silt loam is not good cropland and should be left in native meadow.

Collinsville fine sandy loam, gently sloping phase (2%–6% slopes) (CE).—This is a shallow sandy soil developed over acid sandstone and under grass vegetation. The sandstone is similar to that underlying the Bates and Boone soils. Though this fine sandy loam developed under grass vegetation, a considerable quantity of sumac, briers, persimmon, and other small shrubs grow in association with the prairie grasses. This phase occurs in the northwestern part of the county and is associated with soils of the Bates, Parsons, and Boone series.

The soil is 10 to 20 inches deep over sandstone and has weakly defined subsoil horizons, whereas Bates fine sandy loam, gently sloping phase, is 30 to 40 inches deep and has distinct subsoil layers. The Collinsville soil differs from the Boone soils in having a higher organic-matter content and darker color, and from the Parsons in not having a claypan subsoil. Because the soil has no zone of compaction and the underlying sandstone is relatively porous, water moves rapidly through the profile.

Profile description:

0 to 8 inches, pale-brown to grayish-brown very friable fine sandy loam with a weakly defined fine granular structure.
8 to 14 inches, light yellowish-brown fine sandy loam or loam containing varying quantities of sandstone fragments.
14 inches +, yellowish-brown thin-bedded sandstone.

The soil is acid throughout, and varying quantities of sandstone fragments are present through the entire soil mass. Included are small areas with a shallow profile like that of the Bates soil.

Use and management.—Most of Collinsville fine sandy loam, gently sloping phase, is used for pasture and hay. The pasture lands, for the most part covered with brush and natural prairie grasses, have a carrying capacity of about one mature cow or horse to every 5 to 7 acres. Some areas are cleared of brush and used for hay, and a few small fields are cultivated to small grains.

Collinsville fine sandy loam, sloping phase (6%–10% slopes) (CF).—The profile of this phase is essentially the same as that described for the gently sloping phase, but it averages a little shallower to bedrock. The soil occurs on stronger slopes in the same general area as the gently sloping phase. Nearly all of the land is used for pasture.

Collinsville stony fine sandy loam, sloping phase (5%–12% slopes) (CG).—Except for its higher content of stone in the surface soil, this phase has profile characteristics essentially the same as those for Collinsville fine sandy loam soils. The sandstone fragments, 1 to 10 inches in diameter, project several inches above the ground and occupy 40 to 60 percent of the surface area.

None of the soil is cultivated. Some areas are used for meadow, but most are pastured. The carrying capacity of pastures is slightly less than for the sloping phase of Collinsville fine sandy loam.

Connor silt loam (0%–1% slopes) (GH).—This very light-colored claypan soil developed on terraces and has a profile description as follows:

0 to 7 inches, light-gray friable silt loam with a weak fine granular structure.
7 to 15 inches, white or very pale-brown friable silt loam with a platy structure.
15 to 28 inches, light brownish-gray and light-brown hard clay.
28 to 40 inches, light-gray silty clay somewhat less hard than the above layer.

The entire profile is strongly acid.

Use and management.—Because of its low fertility, poor drainage, and poor structure, Connor silt loam is not suited to crop production. Several areas have been cleared and farmed, but are now abandoned and growing up in brush. The soil is best suited for forest or pasture. Lespedeza and redtop are the best of the pasture species.

Craig cherty silt loam, gently sloping phase (2%–6% slopes) (CK).—This moderately deep cherty soil of the uplands developed under grass vegetation. It occupies several small areas in the southern half of the county and is associated with Eldon, Gerald, Newtonia, and Labette soils. In color it is similar to Eldon soils, but it has a mottled silty clay loam subsoil instead of the brown stony silt loam subsoil of the Eldon. This soil is cherty, whereas the Labette is chert free. The Gerald soils are chert free and have a clay subsoil.

Profile description of Craig cherty silt loam, gently sloping phase:

0 to 10 inches, grayish-brown friable granular cherty silt loam, the chert fragments averaging less than 3 inches in diameter and making up about 25 percent of the soil mass.
10 to 14 inches, brown friable cherty silt loam with a coarse granular structure.
14 to 26 inches, pale-brown slightly hard cherty silty clay loam mottled with strong brown, or brick red; moderately well-defined fine blocky (¼- to ½-inch particles) structure.
26 to 36 inches, yellowish-brown and brown mottled cherty silty clay loam.
36 inches +, mass of chert, the crevices of which are filled with yellowish-brown, brown and reddish-brown silty clay loam.

The entire profile is acid. Included in some bodies of this soil are small areas of Gerald and Eldon soils.

Use and management.—Craig cherty silt loam, gently sloping phase, usually occurs in areas too small to be farmed separately. It is farmed in the same manner as the associated Eldon, Labette, and Gerald soils. Near Joplin it is used mostly for pasture, but in the eastern part of the county most of it is cultivated, and small grains, hay, and corn are the crops grown. Under ordinary management wheat yields about 12 bushels, and corn, about 25 bushels an acre. Soil use and management are approximately the same as for the phases of Eldon cherty silt loam.

Cumberland gravelly silt loam (1%–5% slopes) (CL).—Though this soil looks much like Cumberland silt loam (the soil next described), it contains appreciable quantities of chert gravel through its profile. It is generally associated with Cumberland silt loam, but is not so extensive.

Use and management.—Because of its gravel content, Cumberland gravelly silt loam is not so easy to till as Cumberland silt loam. Also, it occurs in small areas, most of which are cut by drainageways. About 50 percent of the land is cultivated, and the rest is used for pasture. The crops grown are small grains, clovers, and corn. Crop suitabilities of the soil are about the same as for Cumberland silt loam, but yields average slightly less.

Cumberland silt loam (1%–5% slopes) (CM).—This reddish-brown silt loam of the terrace occurs in the area of limestone-derived upland soils and is referred to locally as red limestone terrace or high bottom. The largest areas are along the Spring River and Center Creek. The soil is associated with Elk and Taft soils but is redder and better drained than either of them.

Profile description:

0 to 8 inches, light reddish-brown very friable silt loam with a moderately well defined medium granular structure.
8 to 18 inches, reddish-brown to yellowish-red friable silty clay loam with a well-defined nutlike structure; soil particles ¼ to ½ inch in diameter.
18 to 30 inches, yellowish red to red slightly heavier silty clay loam.
30 to 60 inches, yellowish-red friable silty clay.

The entire profile is moderately acid.

Use and management.—Cumberland silt loam is one of the most productive soils in the county. Probably 80 percent is under cultivation. The principal crops are corn, small grains, clovers, alfalfa, and lespedeza. About 2 tons of lime an acre are necessary for production of alfalfa and clover. A mixed fertilizer is used with wheat. With use of lime, fertilizer, and a legume in the rotation, yields of 40 to 60 bushels of corn and of 18 to 30 bushels of wheat an acre are obtained.

Dennis silt loam, gently sloping phase (2%–6% slopes) (DA).—This moderately dark soil developed from sandy shale on gentle slopes. It is related to the Bates soil but differs in being slightly darker, in having a heavier subsoil, and in being underlain by sandy shale rather than thin-bedded sandstone. The soil is not extensive in this county.

Profile description:

0 to 9 inches, gray to grayish-brown very friable silt loam that appears dark gray when wet; well-defined fine crumb structure.
9 to 16 inches, grayish-brown to brown friable heavy silt loam with a coarse granular structure.
16 to 28 inches, reddish-brown, yellowish-brown, and pale-yellow mottled, slightly hard silty clay loam to light silty clay; fine blocky structure.
28 to 40 inches, light yellowish-brown and yellowish-brown friable, silty clay loam without distinct structure particles; grades into partly disintegrated thinly bedded yellowish-brown sandy shale.

All layers of the profile are moderately acid. The depth to shale varies from about 36 to 50 inches.

Use and management.—Dennis silt loam, gently sloping phase, is nearly all in cultivation and is used for small grain, corn, and hay. It is more productive of these crops than the Bates and Parsons soils with which it is associated, but its crop suitabilities and management problems are much the same as for the Bates soil.

Crops are benefited by applying fertilizer and about 3 tons of lime an acre. In favorable seasons corn yields 35 to 50 bushels and wheat, 18 to 25 bushels. Average yields, under ordinary management, are about 25 bushels of corn or 15 bushels of wheat an acre.

Dunning silt loam (0%–1% slopes) (Dʙ).—This medium-textured dark-colored alluvial soil occupies poorly drained areas in the larger bottoms and narrow bands bordering small streams in the northeastern part of the county. It is associated with Huntington, Lindside, and Melvin soils but is darker than any of these.

Profile description:

0 to 10 inches, grayish-brown to dark-gray soft granular silt loam; reaction, slightly acid.

10 to 16 inches, grayish-brown to dark-gray slightly hard silty clay loam with a coarse granular structure; reaction, nearly neutral.

16 to 40 inches, olive to olive-gray hard or very plastic silty clay; reaction, nearly neutral.

In places along small streams there is chert at a depth of 30 to 40 inches.

Use and management.—Most of the Dunning silt loam is used for pasture or meadow. It is especially well suited to bluegrass, hop clover, and lespedeza. Some areas are cultivated, and corn is the principal crop. The suitability of this soil for cultivation depends upon drainage and the size and shape of the area. Well-drained areas produce good yields of corn.

Dunning silty clay loam (0%–1% slopes) (Dc).—This moderately heavy textured dark-colored alluvial soil occupies poorly drained areas in the larger bottoms, usually near the bluffs.

Profile description:

0 to 16 inches, dark-gray to black friable silty clay loam with a well-developed granular structure; slightly acid.

16 to 40 inches, olive-gray to olive very plastic silty clay or clay; reaction, nearly neutral.

Use and management.—Dunning silty clay loam is used and managed in much the same way as Dunning silt loam. It tends to be more poorly drained than Dunning silt loam and is more difficult to drain with ditches or tile. Only a small percentage of the soil is cultivated, even though it is fertile. Because of deficient drainage, it is used largely for grass.

Eldon cherty silt loam, gently sloping phase (2%–7% slopes) (Eᴀ).—This is a dark-colored shallow cherty gently rolling grassland soil extensive in the eastern, central, and southwestern parts of the county. Because the soil mantle is shallow over rock and the content of chert is high, the water-holding capacity of the soil is moderately low. The organic-matter content is moderately high. The soil has less clay and more chert in the subsoil, is shallower to stone, and contains more stone in the surface than the associated Craig, Labette, and Gerald soils and is darker than the associated reddish-brown Newtonia soils.

Profile description of the Eldon cherty silt loam, gently sloping phase:

0 to 9 inches, dark grayish-brown very friable cherty silt loam with a crumb-like structure; rough-surfaced, dirty-brown chert fragments, most of them less than 3 inches in diameter, occupy 25 to 30 percent of the soil mass.

9 to 14 inches, brown to reddish-brown friable granular cherty silty clay loam.
14 to 24 inches, brown friable very cherty to stony silty clay loam.
24 inches +, broken mass of chert imbedded in reddish-brown silty clay.

Limestone bedrock occurs at a depth of 4 to 10 feet. The entire soil profile is moderately acid. Included are small areas with mottled cherty silty clay loam or silty clay subsoil.

Use and management.—About 60 percent of the Eldon cherty silt loam, gently sloping phase, is used for pasture or meadow. Wheat, oats, lespedeza, and corn are the principal crops grown in cultivated areas. The pastures have a carrying capacity of about one mature horse or cow to 3 to 5 acres for the pasture season.

When lime, fertilizers, and legumes are used, yields of wheat average about 25 to 30 bushels an acre and yields of lespedeza hay average about 1½ tons. Under good management corn yields 50 or more bushels an acre in favorable seasons. Nevertheless, corn is frequently damaged by drought because the water-holding capacity of this soil is low. The yields of corn, even under good management, therefore do not average more than 35 to 40 bushels an acre. Farming on the contour helps to conserve moisture and control erosion, but because the soil mantle is shallow, most areas of this cherty soil are not suitable for terracing.

Eldon cherty silt loam, nearly level phase (1%-2% slopes) (Eb).—Although this soil is associated with the gently sloping phase of Eldon cherty silt loam, it occupies more level topography. Profile characteristics are essentially the same for both, but the surface soil of this phase averages slightly deeper than that of the gently sloping phase. The two phases are used in about the same way, but danger of damage through erosion is slightly less on this nearly level phase.

Eldon silt loam, gently sloping phase (2%-7% slopes) (Ec).—The slope range and topographic position of this phase are about the same as for the gently sloping phase of Eldon cherty silt loam, and the associated soils are the same.

The surface soil, about 8 inches thick, is mellow dark grayish-brown silt loam of a granular or crumb structure. The subsurface, or transitional layer, is brown coarse granular silt loam or silty clay loam about 4 inches thick. Variable quantities of small chert fragments are scattered throughout the surface soil, and there is an occasional large chert boulder. Less than 10 percent of the surface soil is taken up by chert fragments, which do not interfere with tillage. Below the surface foot, the profile is essentially the same as that described for Eldon cherty silt loam, gently sloping phase. The subsoil grades through a light-brown very cherty silt loam into a mass of chert.

Included with this soil in mapping are small areas of cherty silt loam, as well as small areas deeper to chert than average that have a distinct subsoil layer similar to that in the Craig or Labette soils.

Use and management.—Eldon silt loam, gently sloping phase, is easier to till than the gently sloping phase of Eldon cherty silt loam. Management problems are about the same for the two soils. Crop yields seem slightly higher on this soil than on the cherty silt loam, but differences are slight. Land use is about the same on the two. The corn acreage is greater on this soil; about 10 percent of its total area is in corn.

Eldon silt loam, nearly level phase (1%–2% slopes) (Ed).—This soil occurs on smoother topography in association with the gently sloping phase of Eldon silt loam. In profile characteristics and land use this phase is about the same as the gently sloping phase, but the danger of erosion is less.

Eldorado stony silt loam, gently sloping phase (1%–6% slopes) (Ee).—This shallow stony soil contains more stones of larger size in its surface soil and has a slightly shallower soil mantle than the associated Eldon soils, but it is similar to them in other general features. Characteristically, this soil occurs on low mounds above the general level of the upland. The surface is covered with chert stones, many of them more than 8 inches in diameter. More than 50 percent of the soil mass is made up of stone. The dark surface soil grades into a mass of chert rock at a depth of 8 to 14 inches.

The soil has developed under a vegetation of prairie grasses, shrubs, and briers. On many of the fields this vegetataion still remains, but the brush has been removed from others. Nearly all of the land is used for pasture. The grasses thrive best in wet seasons. From 5 to 7 acres are usually required to pasture a mature cow or horse.

Eldorado stony silt loam, sloping phase (6%–14% slopes) (Ef).—Areas of Eldorado stony silt loam occurring on steeper slopes are mapped in this phase. Like the gently sloping phase, this soil is used for pasture, and it is of about equal value for that purpose.

Elk silt loam (1%–4% slopes) (Eg).—This brown soil occurs on nearly level to gently sloping terraces and has moderately well defined layers. The bodies are along major streams in the area where soils of the limestone upland occur. Drainage, both surface and internal, is generally good.

The soil is associated with soils of the Cumberland, Taft, and Robertsville series. It is intermediate in color between the better drained reddish Cumberland and the imperfectly drained grayish-brown Taft soils. In general, it occupies slightly more sloping topography than the Taft. Bands of it commonly occur on slopes around the edges of nearly level areas of Taft soil. The Cumberland, Taft, and Robertsville soils were originally forested. This soil supports a vigorous growth of mixed hardwoods.

Profile description of Elk silt loam:

0 to 10 inches, grayish-brown very friable silt loam of fine granular structure.
10 to 16 inches, light yellowish-brown friable coarse granular silt loam or silty clay loam.
16 to 28 inches, light yellowish-brown slightly hard silty clay loam slightly mottled in places with dark brown; a well defined fine blocky structure.
28 to 40 inches, light yellowish-brown friable silty clay loam.

The entire profile is moderately acid.

Use and management.—Elk silt loam is moderately fertile, has good physical features, and is responsive to fertilizer treatment. Probably 60 to 70 percent of it is cleared and under cultivation. Corn, small grains, and lespedeza are the principal crops.

When this soil is limed, alfalfa, red clover, and sweetclover can be grown successfully. On land properly managed about 50 bushels an acre of corn or 25 bushels of wheat an acre are obtained. When the soil is cropped continuously without additions of fertilizer or organic matter, yields decline rapidly to a low level of about 20 bushels of corn or 10 or 12 bushels of wheat an acre. Various pasture grasses, including bluegrass, thrive.

Some of the sloping areas are subject to erosion. Slopes steeper than 2 percent should be farmed on the contour, and those longer than 300 feet probably should be terraced. Diversion ditches at the edge of the upland may aid in some places to prevent water that falls on the hills from washing across the terraced areas.

A 3- or 4-year rotation of corn, small grain, and legumes is generally practiced. The legume is on the soil 1 or 2 years in the rotation, and a fertilizer high in phosphate is applied for the small grain.

Gerald silt loam, level phase (0%–1% slopes) (Gc).—Like all members of the Gerald series, this is a claypan soil developed under prairie vegetation. It occurs throughout the eastern, central, and southwestern parts of the county, and like most soils residual from limestone, it is formed from sands, silts, and clays left after the limestone dissolved.The parent material may also be derived partly from shale. Drainage is poor because of the nearly level topography and clay subsoil.

The soil is associated with Labette, Eldon, and Craig soils but differs from them in having a clay subsoil. It is also associated in places with Carytown soil but is darker and is underlain by chert. The Carytown soil has an alkaline clay subsoil, whereas this soil is acid throughout. There is also a difference in topography. This soil occupies crests of ridges, but Carytown soil occurs in wide shallow basins on lower slopes.

Profile description of Gerald silt loam, level phase:

0 to 9 inches, grayish-brown to gray very friable silt loam with a fine granular structure.
9 to 15 inches, light brownish-gray to light-gray friable silt loam with very poorly defined coarse granular structure; slightly defined platy structure in places.
15 to 25 inches, grayish-brown stiff compact coarse granular clay mottled with brown and reddish-brown; soil is very plastic when wet.
25 to 36 inches, grayish-brown and brown mottled, brittle or hard silty clay; varying quantities of chert.
36 to 60 inches, slightly cemented broken chert; spaces between fragments filled with brown, yellowish-brown, and reddish-brown silty clay; fine material redder in the deeper part of the layer.

The depth to chert varies from 30 to 60 inches. See plate 5, *A* for another profile of this soil.

Use and management.—Gerald silt loam, level phase, is an important agricultural soil in this county. It is extensive, moderately productive, and easily farmed. All of it is suitable for cultivation, but about one-third is kept in permanent pasture. Wheat, lespedeza, and corn are the principal crops. Sorghums, flax, redtop, and timothy are minor crops. On some areas in the northeastern part of the county pure stands of redtop are harvested for seed. Lespedeza is used for pasture, hay, and seed. Cowpeas and soybeans are grown for both hay and seed. The soil requires lime for growing clover. Fertilizer is used on wheat and on much of the corn.

Gerald silt loam, nearly level phase (1%–3% slopes) (Gf).—This soil occupies gentle slopes in association with the level phase. (pl. 5, *B*). The profile characteristics of the two are similar, but the gray subsurface layer is not quite so distinct or so thick on the gentle slopes of this soil as on the level phase.

Use and management.—On a field of Gerald silt loam, nearly level phase, in this county, wheat yields in the period 1909–13 were increased from 16.9 to 23.2 bushels an acre by the use of 150 pounds an acre of a low quality (bone meal) phosphate fertilizer. Corn yields were increased from 34.6 to 43.5 bushels an acre by the use of only 75 pound an acre of a low-grade (2–8–2) fertilizer (*2*). The field on which these experiments were conducted is slightly more productive than most of the Gerald soils in the county. Yields of wheat on untreated ground do not average more than 15 bushels, and yields of corn are not more than 25 bushels.

Surface drainage is better on this phase than on the level one, and crops are therefore less damaged by wet weather. Because of better drainage, this soil shows somewhat more consistent increases from fertilizer applications than the level phase.

Gerald silt loam, level deep phase (0%–1% slopes) (GB).—The most extensive areas of this soil are in the northeastern and north-central parts of the county. The underlying chertpan is generally 40 inches or more below the surface. The soil occurs in areas where the soil mantle is deep and is associated with Carytown and Woodson soils. Ordinarily it occupies the level areas on broad divides between drainageways, and the Carytown and Woodson soils occupy the shallow basin areas on the lower parts of the slopes. This phase is used and managed in about the same way as the level phase of Gerald silt loam.

Profile description:

0 to 8 inches, grayish-brown acid very friable silt loam with a well-defined fine granular structure.

8 to 15 inches, light brownish-gray friable almost structureless strongly acid silt loam.

15 to 28 inches, compact hard grayish-brown clay mottled with brown and reddish-brown; very plastic when wet; a well-defined medium blocky structure; slightly acid.

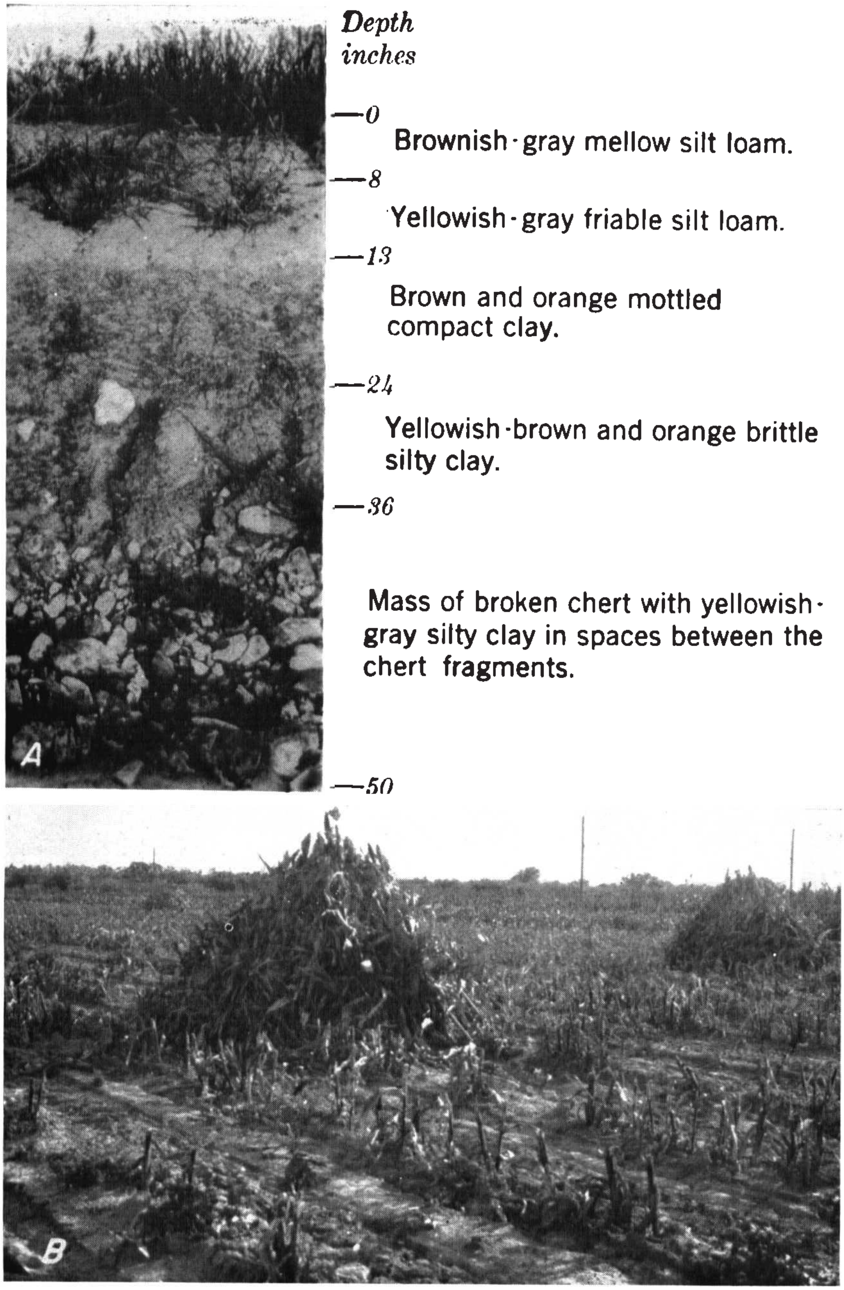
28 to 60 inches, yellowish-brown or grayish-brown slightly alkaline plastic silty clay.

Gerald silt loam, nearly level deep phase (1%–3% slopes) (GE).—This phase has about the same profile characteristics as the level deep phase. Use and management are about the same as on the nearly level phase of Gerald silt loam.

Gerald silt loam, level shallow phase (0%–1% slopes) (GD).—This soil is similar to the level phase of Gerald silt loam but has a thinner soil mantle over chert. The subsoil is as dense and compact as that of the level phase but not so thick. Also, this soil is not so extensive as the level phase, and slightly less productive. The problems of use and management, however, are essentially the same.

Gerald silt loam, nearly level shallow phase (1%–3% slopes) (GG).—This phase has the same kind of profile as the level shallow phase of Gerald silt loam. Use and management are essentially the same as for the nearly level phase.

Gerald silt loam, depressional phase (0%–2% slopes) (GA).—Areas of this phase are small and occur in shallow depressions, mostly in the southwestern part of the county. The profile is similar to that



Depth inches

—0 Brownish-gray mellow silt loam.

—8 Yellowish-gray friable silt loam.

—13 Brown and orange mottled compact clay.

—24 Yellowish-brown and orange brittle silty clay.

—36 Mass of broken chert with yellowish-gray silty clay in spaces between the chert fragments.

—50

A, Profile of Gerald silt loam, level phase.
B, Cane on Gerald silt loam, nearly level phase. Gerald soils are used extensively for small grains and lespedeza and are better suited to sorghums than to corn.

of Gerald silt loam, level phase, but because of location, this soil is more poorly drained than are any of the other Gerald soils. Most areas are in pasture.

Huntington gravelly silt loam (0%-1% slopes) (HA).—Many small areas of this gravelly soil are scattered throughout the area of Huntington soils. They occur in the small stream bottoms and along the channels of the larger streams. Except for its content of water-worn chert gravel, the soil is similar to Huntington silt loam. The chert gravel averages about 2 inches in diameter and makes up 10 to 40 percent of the soil mass.

Use and management.—Huntington gravelly silt loam is droughty and more difficult to till than Huntington silt loam. Only about 40 percent of this gravelly soil is cultivated; the rest is used for pasture. Much of the acreage is not farmed, because it occurs in narrow and irregularly shaped areas and therefore can be used more economically for pasture. The cultivated areas are used mostly for corn. Yields average slightly lower than on Huntington silt loam.

Huntington silt loam (0%-1% slopes) (HB).—This brown alluvial soil is in the area of limestone-derived soils. In the larger valleys it borders streams and is associated with Lindside and Melvin soils. In the smaller valleys it occupies the entire flood plain. The soil is uniform in color and texture to a depth of several feet. It is productive and well drained, but most of it is subject to annual floods of short duration.

The surface 10 or 12 inches is a pale-brown or grayish-brown mellow silt loam. This layer has a moderately well developed fine granular structure, is moderately well supplied with organic matter, and is slightly acid. The material changes little with increasing depth but averages slightly lighter in color below the surface foot. As is characteristic of alluvial soils, there may be lenses of sandy material at any depth.

Use and management.—Huntington silt loam is one of the most productive soils in the county. Nearly all of the flood plains of the larger streams are infested with Johnson grass, however, and as this weed is spread by floodwaters, it is difficult to control.

About 70 percent of the soil is cultivated. Corn is the principal crop. The average yield of corn is 40 bushels an acre, but some yields as high as 70 bushels an acre are obtained. In some places where the Johnson grass infestation is extreme the land is used for meadow. Noncultivated land is pastured, and a few woodlots remain. Problems of flood control and weed eradication are difficult and require community action on a watershed basis.

Huntington silt loam, dark phase (0%-1% slopes) (HC).—Though this soil is much like Huntington silt loam, it has a darker surface soil. It occurs mostly in the Spring River bottom east of Carthage. It is slightly more productive than Huntington silt loam, but crop suitabilities and management for the two are about the same.

Huntington silt loam, high-bottom phase (0%-1% slopes) (HD).—This soil is similar to Huntington silt loam but occurs on the higher parts of the flood plains that are subject to only occasional overflow.

The surface 12 inches is a grayish-brown mellow silt loam with a moderately well defined fine granular structure. The next 12 inches is yellowish-brown slightly finer textured silt loam. Below a depth of about 24 inches the soil is a light yellowish-brown coarse granular silt loam or silty clay loam. The lower subsoil averages heavier in texture than the subsoil of Huntington silt loam.

Use and management.—Huntington silt loam, high-bottom phase, is subject to flooding once every 3 to 5 years. It is essentially equal to Huntington silt loam in fertility and is a more desirable soil because it is less frequently flooded. Nearly all of the land is cultivated; it is used for wheat, oats, corn, alfalfa, clover, and other legumes grown for hay, pasture, or seed. The yields of corn are about the same as on Huntington silt loam. Wheat yields average about 30 bushels an acre. Johnson grass infestation is general over this soil but is more nearly under control than on the lower bottoms.

Inola silt loam, level phase (0%–1% slopes) (IA).—This and the nearly level phase next described are formed from fine-textured deposits over beds of rounded chert gravel. This soil occupies level areas on old very high terraces in the west-central and southwestern parts of the county in association with the Melvern and Riverton soils. The Riverton and Melvern soils differ in having gravel at the surface and in lacking a claypan subsoil. The Parsons soils are similar to this level phase in profile characteristics, but they differ in being underlain by shale or sandstone instead of gravel. Because of its level surface and dense clay subsoil, the Inola soil has poor drainage.

Profile description of Inola silt loam, level phase:

0 to 9 inches, light brownish-gray friable silt loam with a weakly defined fine granular structure.
9 to 15 inches, light-gray brittle silt loam with a weakly defined platy structure.
15 to 27 inches, dark-brown to grayish-brown very hard compact clay with mottlings of reddish-brown and yellowish-brown; well-defined fine blocky structure.
27 to 40 inches, pale-olive and reddish-brown mottled very plastic clay.
40 inches +, rounded chert gravel and clay.

The entire profile is strongly acid. The depth to chert varies from about 36 to 60 inches.

Use and management.—About 70 percent of the Inola silt loam, level phase, is cultivated. Wheat is the most extensive crop, and yields of 25 bushels an acre are obtained when it is fertilized. Without fertilizer, yields average about 10 bushels an acre. A considerable acreage of corn is grown, but yields, under ordinary management, average 20 bushels an acre. Individual fields in favorable seasons and under good management yield as high as 50 bushels of corn.

Unless this soil is limed and fertilized, lespedeza and hop clover will not make good growth. As most of the pastures are untreated, the quality of browse is low. In recent years soybeans have been grown for seed. The yields obtained are about 8 bushels an acre on untreated soil and about 20 bushels on limed and fertilized soil.

Inola silt loam, nearly level phase (1%–3% slopes) (IB).—This soil has essentially the same kind of profile as the level phase of Inola silt loam. The surface soil is slightly shallower, the gray subsurface layer is not so distinct, and the upper subsoil is not so dark.

The upper subsoil is a mottled yellowish-brown and reddish-brown very hard clay with thin coatings of grayish brown and dark brown on the structure particles. This phase is used in about the same way as the level phase, and yields are approximately the same.

Labette silt loam, nearly level phase (0%–2% slopes) (LB).—Many areas throughout the eastern, central, and southeastern parts of the county are occupied by this moderately dark stone-free grassland soil with an open permeable subsoil. It is associated with Newtonia, Eldon, Craig, and Gerald soils but differs from them in some respects. It is grayish brown or dark gray, whereas Newtonia soils are brown. Also, it is chert free, whereas Eldon and Craig soils are cherty. It has an open permeable subsoil that is not a dense clay like that of the Gerald soils.

Profile description of Labette silt loam, nearly level phase:

0 to 10 inches, grayish-brown to dark-gray very friable silt loam with a well-developed granular or crumb structure.
10 to 16 inches, grayish-brown to brown friable coarse granular silt loam.
16 to 24 inches, brown or yellowish-brown friable silty clay loam with a well-developed coarse granular structure.
24 to 36 inches, light yellowish-brown and gray mottled friable silty clay loam.
36 inches +, reddish-brown cherty silty clay underlain by broken chert at depths varying from 40 to 60 inches.

The entire soil profile is moderately acid.

Use and management.—Labette silt loam, nearly level phase, is one of the best soils in the county. It is fertile, well drained, and easily farmed. About 75 percent is in cultivation and is used for all crops grown in this region. Corn, wheat, and lespedeza are the most important. Red clover, sweetclover, and alfalfa are grown on limed land. Yields of wheat average about 28 bushels when fertilizer is used, and about 15 when it is not. Corn yields average about 30 bushels an acre. When lime, fertilizers, and legumes precede corn, yields of 60 or more bushels an acre are obtained. Korean and common lespedeza, as well as the hop clovers, do well. Most bluegrass pastures contain some lespedeza.

Labette silt loam, gently sloping phase (2%–6% slopes) (LA).—Profile characteristics and use of this phase are essentially the same as for the nearly level phase of Labette silt loam. There is more danger of erosion damage on this gently sloping soil, however, and clean-tilled fields should be farmed on the contour.

Lightning silt loam (0%–1% slopes) (LC).—This light-colored, poorly drained alluvial soil occurs on the flood plains of streams that drain sandstone and shale uplands. It is associated with the Verdigris soils, which are brown and well drained, and is similar in appearance and value to Melvin silt loam—a soil developed on flood plains in limestone areas. Lightning silt loam was originally forested.

Profile description:

0 to 4 inches, light brownish-gray, friable silt loam or very fine sandy loam with a weakly defined coarse granular structure.
4 to 18 inches, pale yellow floury structureless silt loam "gray layer."
18 to 34 inches, pale yellow to light yellowish-brown brittle weakly cemented clay loam.
34 to 60 inches, pale-olive and yellowish-white mottled brittle massive clay loam.

The entire profile is strongly acid. Included with this soil are areas in which the brownish-gray surface soil is 6 or 8 inches thick and the light-colored subsurface layer is correspondingly thinner.

Use and management.—Lightning silt loam is known locally as crayfish land because of its poor drainage and poor structure. About 20 percent is cultivated. The noncultivated land is in pasture or timber. The cultivated fields are used for corn or sorghums, and yields are low. The soil is best suited to pasture or for production of timber.

Lindside silt loam (0%–1% slopes) (Le).—This is an imperfectly drained alluvial soil with a brown surface soil darker than the subsurface layer. It is associated with the Huntington soils and is similar to them except for its imperfect drainage. It differs from Huntington soils in having a grayer surface soil and a pale-yellow subsurface layer. The Huntington soils are brown throughout.

Profile description of Lindside silt loam:

0 to 8 inches, grayish-brown friable fine granular silt loam.
8 to 14 inches, light brownish-gray friable silt loam with a weakly defined coarse granular structure.
14 to 28 inches, light-gray floury nearly structureless silt loam.
28 to 33 inches, pale olive, brittle, and weakly cemented silty clay loam.
33 to 48 inches, pale-yellow friable silty clay loam.

This soil is moderately acid throughout.

Use and management.—About 70 percent of Lindside silt loam is in cultivation. Corn, small grains, and hay are the field crops grown. Corn is the principal crop. Yields of corn are lower than on Huntington soils and under ordinary management average about 35 bushels an acre. Lespedeza makes a vigorous growth on this soil, and much of the acreage is used for that crop. As on Huntington soils, most areas are subject to overflow, but because of imperfect internal drainage, the soil stays wet for longer periods following inundation.

The lime requirement is 2 to 3 tons an acre, and crops respond to phosphate and potash fertilizer. Like the Huntington soil areas, most of this soil along the Spring River and Center Creek is heavily infested with Johnson grass. To bring this weed under control, it will be necessary to organize control measures on a watershed basis.

Lindside silt loam, high-bottom phase (0%–1% slopes) (Lf).—Although occurring in association with Lindside silt loam, this phase occupies higher parts of the flood plain back from stream channels. It resembles the associated soil, but its gray layer is not so well defined.

The surface 8 inches is brownish-gray mellow fine granular silt loam. The subsurface layer, 8 to 12 inches thick, is light brownish-gray friable silt loam. The subsoil, at 16 to 20 inches, is pale-yellow coarse granular silty clay loam that grades into a light yellowish-brown silty clay loam at a depth of about 30 inches. The soil is moderately acid throughout.

Use and management.—Lindside silt loam, high-bottom phase, is subject to only occasional overflow. Because flood damage is less and drainage is better, it is considerably more valuable than Lindside silt loam. Nearly all of it is in cultivation. Corn is an important crop; the acreage of wheat and clovers is greater than on Lindside silt loam. Under ordinary management corn yields about 40 bushels, and wheat, about 15 bushels.

When the soil is limed, red clover or sweetclover thrive. Alfalfa can be grown, but it does better on the high-bottom phase of Huntington silt loam. The threat of overflow also restricts the acreage of alfalfa.

Lindside and Huntington soils (0%–1% slopes) (Ld).—Along some of the small streams in the eastern and southern parts of the county the alluvial soils are so variable that no one soil type characterizes a mappable area. Lindside soils predominate, but areas of Huntington and Dunning soils are also included. The soil areas all occur as narrow bands, usually only a few hundred feet wide, and are dissected by drainage channels. Nearly all of them are in pasture or forest. A few small areas are farmed, usually with soils of the adjoining upland.

Melvern gravelly loam, gently sloping phase (2%–5% slopes) (Ma).—This gravelly soil of the grasslands occurs in association with Riverton and Inola soils, but is shallower and contains more gravel than either of them. Most areas are in the western part of the county, but a few occur as far east as Carthage. In the western part the gravelstones from which the soil is formed overlie sandstone, but farther east the gravel rests directly on limestone.

Profile description:

0 to 8 inches, grayish-brown friable fine granular gravelly loam or silt loam.

8 inches +, pale-olive to light yellowish-brown very gravelly loam; soil material is in places a clay loam in a mass of gravel; gravel not cemented and very permeable.

The entire soil profile is strongly acid, but the deep subsoil is more acid than the surface layer. The gravel consists of rounded and stained chert fragments averaging about 2 inches in diameter.

Use and management.—Approximately 40 percent of Melvern gravelly loam, gently sloping phase, is cultivated. Some 60 percent is in pasture or, as is the case for Riverton gravelly loam, gently sloping phase, used for farmsteads. Wheat is the principal grain crop. Yields are slightly lower than on Riverton soil and average about 12 bushels an acre under ordinary management. The use of lime and fertilizer improves the stand and quality of pasture grasses and legumes. A few orchards have grown fairly well. Peach trees seem to make better growth than apple trees.

Melvin silt loam (0%–1% slopes) (Mb).—This gray poorly drained first bottom soil occurs in small isolated pockets or swales away from overflow channels in association with the Lindside and Huntington soils, but is less extensive than either. Its position is much the same as that occupied by Dunning soils, but the Dunning soils are dark gray, whereas this soil is light gray. Both surface and internal drainage are poor.

The surface 4 to 6 inches is a light-gray brittle silt loam with a weakly defined fine granular structure. The subsurface horizon, or gray layer, is about 10 inches thick, and the material is light-gray or yellowish-white brittle almost structureless silt loam. The upper 10 to 14 inches of the subsoil is light-gray hard compact silty clay loam or silty clay. Below about 30 inches the subsoil grades into a plastic pale-yellow and reddish-brown mottled silty clay that extends to a depth of several feet. The soil is strongly acid throughout.

Use and management.—Because of poor drainage, low fertility, and poor physical properties, the small areas of Melvin soil are almost all in pasture or forest. The cleared areas support a fair growth of coarse bunchgrasses.

Neosho silt loam (0%–2% slopes) (NA).—Level terraces along streams that drain the sandstone and shale areas are occupied by bodies of this soil. It is not extensive and occurs along the North Fork Spring River near the western edge of the county. Narrow bands of Cabanal soil are on sloping terrace areas bordering this one. Surface drainage is fair, but internal drainage is poor. The profile of this soil is similar to that of Cherokee silt loam, but its gray subsurface layer and upper subsoil are, in general, a little thinner.

Profile description of Neosho silt loam:

0 to 8 inches, light brownish-gray friable silt loam that tends to crust and become brittle when dry.
8 to 16 inches, light-gray to white, floury, nearly structureless silt loam.
16 to 28 inches, gray dense hard clay that breaks into small hard angular fragments when dry; fragments are coated with a brownish black film that makes the soil appear dark.
28 to 40 inches, light-gray and yellowish-brown mottled hard silty clay.

The entire soil profile is strongly acid.

Use and management.—About 60 percent of Neosho silt loam is cultivated, chiefly to wheat and sorghums. Under ordinary management, wheat yields about 10 bushels an acre. Redtop and lespedeza are the dominant pasture plants.

Newtonia cherty silt loam, gently sloping phase (2%–6% slopes) (NB).—The color and textural profile of this soil are the same as for Newtonia silt loam soils, but many chert fragments occur throughout, and in most places the soil is underlain by a bed of chert at a shallow depth.

The chert makes tillage more difficult than on Newtonia silt loam soils. Chert fragments make up 25 to 50 percent of the soil mass, and because of this, the soil tends to be droughty. This soil is slightly less productive than the Newtonia silt loam soils, but management problems and crop suitabilities are much the same.

Newtonia cherty silt loam, sloping phase (6%–11% slopes) (NC).—In profile characteristics this soil is about the same as the gently sloping phase, but it tends to be somewhat more shallow to chert. Because of steeper slopes, it is not so easily farmed and is more subject to damage by erosion. Most of this phase is in pasture or meadow. Only a limited acreage of corn is grown.

Newtonia silt loam, nearly level phase (0%–2% slopes) (NE).—Limestone residuum is the material from which this brown, stone-free soil is derived. Most of the areas are small, usually less than 300 acres in size. This and the other Newtonia soils are associated with Craig, Eldon, and Gerald soils. The Newtonia are the only brown soils in the group with which they are associated.

Profile description of Newtonia silt loam, nearly level phase:

0 to 10 inches, brown to reddish-brown very friable silt loam with a moderately well defined granular structure; soil tends to crust when dry, but the crust is easily broken.
10 to 18 inches, reddish-brown friable coarse granular silty clay loam or heavy silt loam.

18 to 30 inches, reddish-brown friable silty clay loam; colors somewhat brighter and textures heavier than in the above layer.
30 to 50 inches, reddish-brown or red slightly hard silty clay.
50 inches +, red silty clay continues in some places to a depth of several feet; in many places, however, the soil is underlain by chert rock at a depth of 36 to 72 inches.

The soil is moderately acid throughout the entire profile.

Use and management.—Newtonia silt loam, nearly level phase, has moderate to good fertility and excellent physical properties. It responds readily to soil treatment. When it is limed, fertilized, and kept supplied with organic matter by use of legumes or manure, it is one of the most productive soils in this region.

The Missouri Agricultural Experiment Station near Newtonia, in Newton County, maintained an experiment field on an area of Newtonia silt loam, nearly level phase, and the various average yields produced under different treatment (*1*) are shown in table 4.

TABLE 4.—*Average yields of corn, soybeans, wheat, and clover for a 11-year period on Newtonia silt loam, nearly level phase, under different fertilizer treatments*

Treatment	Average yield of—			
	Corn	Soybeans	Wheat	Clover
	Bu.	*Bu.*	*Bu.*	*Lb.*
None	20. 46	5. 17	7. 44	556
Superphosphate 175 pounds	29. 21	6. 40	17. 06	1, 812
Superphosphate 175 pounds and lime 2 tons	33. 82	7. 17	18. 64	2, 859
Superphosphate 175 pounds, potash 15 pounds, and lime 2 tons	36. 18	7. 18	19. 29	3, 435
Manure 8 tons, lime 2 tons, and superphosphate 175 pounds	39. 72	7. 94	22. 78	3, 607

From results shown in table 4 it can be seen that almost any soil treatment gave a marked response. The yields obtained under no treatment are probably slightly lower than the average obtained on farms made up of this soil, because some soil treatments are commonly used on the farms. Under ordinary management, 30 bushels of corn or 15 bushels of wheat are probably average yields on Newtonia silt loam, nearly level phase, in Jasper County.

Probably 80 percent of Newtonia silt loam, nearly level phase, is cultivated in this county. It is used for corn, wheat, lespedeza, clover, and alfalfa. The alfalfa acreage is small, but on the fertilized soil it makes vigorous growth. Newtonia soils are favored for orchards and nursery sites. There are no large commercial orchards on Newtonia silt loam, nearly level phase, in this county, but part of the nurseries at Sarcoxie are on Newtonia soils.

Newtonia silt loam, gently sloping phase (2%–6% slopes) (ND).—The distribution, profile characteristics, and use of this phase and the nearly level phase of Newtonia silt loam are much the same. This phase has more erosion, and erosion is more difficult to control than it is on the nearly level phase. Sloping fields should be farmed on the contour and kept under a vegetative cover during winter. Terraces can be used very effectively on this gently sloping phase.

Nixa cherty silt loam, gently sloping phase (1%–6% slopes) (NF).—This light-colored moderately cherty ridge-top soil is in the area of Bodine soils. It is derived from cherty limestone residuum but contains less chert and has a deeper soil mantle than the Bodine soils.

Profile description:

0 to 2 inches, under forest vegetation this immediate surface layer is loose very fine granular light brownish-gray cherty silt loam; layer destroyed under cultivation.
2 to 10 inches, pale-yellow friable fine granular silt loam containing varying quantities of chert; fragments of chert average less than 3 inches in diameter and occupy less than 30 percent of the soil mass.
10 to 17 inches, grayish-brown to yellowish-brown slightly hard cherty silty clay loam.
17 to 30 inches, mass of chert imbedded in pale-yellow silty material similar to that of the lower Bodine subsoil.

Included with Nixa cherty silt loam, gently sloping phase are a few areas relatively free from chert in the surface layer. Also included are a few small bodies having a clay subsoil similar to the subsoil of the Gerald soils.

Use and management.—About 30 percent of the Nixa cherty silt loam, gently sloping phase, is cultivated. The area not cultivated is about equally in forest and pasture. Most of the forest land is fenced and pastured.

Small grains and lespedeza are the principal crops. The yields of corn are low. Fertilizer is used with most of the wheat grown, and yields are about 12 bushels an acre.

Because of low fertility, moderate stone content, and low moisture-holding capacity, this soil is marginal for crop production. Most areas are best suited to pasture or hay. Use of lime and fertilizer on pasture land is strongly recommended.

Parsons loam, level phase (0%–1% slopes) (PA).—The profile of this soil is similar to that of the level phase of Parsons silt loam. The principal difference is that the surface soil is loam instead of silt loam. Also, the subsoil contains more sand than the subsoil of Parsons silt loam, level phase, and the underlying shale material contains thin beds of sand. About 75 percent of this soil is in cultivation. It is used in much the same way as Parsons silt loam, level phase, and yields are comparable.

Parsons loam, nearly level phase (1%–3% slopes) (PB).—Surface drainage on this soil is better than on the level phase of Parsons loam, but there is some damage through erosion. Land use and crop yields are about the same as for other Parsons soils.

Parsons silt loam, level phase (0%–1% slopes) (PC).—This extensive claypan soil on the level prairies in the northwestern part of the county is associated with soils of the Cherokee, Bates, and Collinsville series. Parsons soils have a denser more compact subsoil than the Bates or Collinsville soils and a less dense claypan than Cherokee silt loam. Because of the level topography, surface drainage is imperfect but is better than on Cherokee silt loam.

Profile description of Parsons silt loam, level phase:

0 to 9 inches, grayish-brown to brownish-gray friable silt loam of fine granular structure.
9 to 15 inches, light brownish-gray to gray almost structureless silt loam.
15 to 27 inches, brown or yellowish-brown hard dense clay of blocky structure; faint brownish-gray coatings show on structure faces.
27 to 40 inches, light yellowish-brown, grayish-brown, and reddish-brown mottled stiff silty clay or clay.
40 inches +, slightly sandy yellowish-brown and gray partly disintegrated shale so soft in most places and its bedding planes so indistinct that it is difficult to distinguish from the clay of the subsoil.

The entire profile is strongly acid.

Use and management.—About 60 percent of Parsons silt loam, level phase, is cultivated. Wheat and sorghums are the principal crops, but soybeans and lespedeza are grown to some extent. Fertilizer is used on wheat and soybeans. The average yield of wheat is about 13 bushels an acre under ordinary management, but on the areas limed and heavily fertilized yields of 25 bushels an acre are not unusual. Most of the areas not cultivated are in native grass that is cut for hay or pastured.

Erosion is not a problem on this soil. The fields are large and easily tilled. Large quantities of lime are used. When limed, the land will support most of the legumes commonly grown in this area. Alfalfa can be grown, but it is difficult to establish and dies out more rapidly than on the more permeable soils.

Parsons silt loam, nearly level phase (1%–3% slopes) (PD).—In profile characteristics this soil is similar to the level phase of Parsons silt loam. Its surface soil is a little browner, however, and the subsurface layer not so thick or so gray. Surface drainage is better than on the level phase. The percentage under cultivation is a little higher, but use of the cultivated areas is the same as for the level phase.

Riverton gravelly loam, gently sloping phase (2%–5% slopes) (RA).—This is a moderately dark gravelly soil with a silty clay loam subsoil layer. It occupies many relatively small areas on gently sloping topography in the general area of Melvern and Inola soils in the western part of the county. It has more soil material throughout its profile and a more distinct subsoil than the more gravelly Melvern soil. The Inola soils are gravel free and have a heavy subsoil.

Profile description of Riverton gravelly loam, gently sloping phase:

0 to 7 inches, grayish-brown to dark grayish-brown very friable, granular loam or gravelly loam; the rounded chert gravel, mostly less than 2½ inches in diameter, makes up about 15 percent of the soil mass.
7 to 18 inches, pale-brown to grayish-brown friable gravelly silty clay loam.
18 to 24 inches, grayish-brown and reddish brown mottled gravelly silty clay loam to silty clay.
24 to 40 inches, brown to light reddish-brown very gravelly silty clay loam.

The soil is very strongly acid throughout the entire profile.

Use and management.—About 50 percent of Riverton gravelly loam, gently sloping phase, is in cultivation. The tilled areas are used principally for small grains and sorgums, and most of the noncultivated areas are in pasture. This soil, together with the Melvern, occupies low rounded mounds that rise 10 to 20 feet above the general level of the plain. These mounds are favored as sites for farmsteads.

Wheat is commonly fertilized, and yields average about 15 bushels an acre. The soil provides better pasture than Melvern gravelly loam, gently sloping phase, but is suited mainly to redtop, lespedeza, and other tolerant species.

Robertsville silt loam (0%–1% slopes) (Rb).—This gray poorly drained claypan soil of the terraces is known locally as crayfish land or buckshot land. It occurs in poorly drained places on the terraces or second bottoms in the general area occupied by soils of the limestone uplands. It is associated with the Taft, Elk, and Cumberland soils but is lighter colored and more poorly drained and has a denser subsoil than any of these. The soil is strongly acid in all layers.

Profile description:

0 to 6 inches, light brownish-gray or gray friable silt loam with a weakly granulated structure.
6 to 16 inches, white brittle platy or structureless silt loam.
16 to 24 inches, grayish-brown and reddish-brown mottled very dense hard clay.
24 to 40 inches, gray and yellowish-brown mottled very plastic silty clay.

Nearly all areas of Robertsville silt loam are used for pasture.

Steep stony land, Baxter soil material (10%–35% slopes) (Sa).—As its name implies, this is a shallow stony land type on steep slopes. It occurs as narrow bands along the edges of the major stream valleys. Limestone outcrops are numerous. Because of its open nature and high chert content, the soil material has a high infiltration rate. The entire soil mass down to the unweathered limestone is permeable and permits ready movement of water, air, and plant roots.

The soil material is reddish-brown silty clay. In some places enough organic matter has collected to make the surface 3 or 4 inches a dark brown. This soil material is nearly neutral in reaction and is high in mineral nutrients.

Most of this land type is forested. It is usually pastured along with adjacent Baxter soils, but is best suited to timber production. Controlled grazing and prevention of burning are the principal management changes needed.

Steep stony land, Bodine soil material (6%–25% slopes) (Sb).—On steeper slopes in the area of Bodine stony silt loam soils are small areas in which the material is almost entirely a mass of chert. The small quantity of fine soil material present is light-yellow floury silt loam similar to that in Bodine stony silt loam. In the southwestern corner of the county are a few small exposures of massive chert beds. These exposures are almost devoid of soil and vegetation, but where soil has collected in the crevices, small trees—mostly post and blackjack oaks—are growing. The chert outcrops are essentially wasteland.

Strip mines (variable slopes) (Sc).—In the northwestern part of this county are several areas from which coal has been strip-mined. The land surface is left in narrow steep-sided ridges averaging about 15 to 20 feet high and 60 feet wide. The material is largely shale and sandstone. It gradually weathers enough to support some tolerant grasses and weeds. The strip-mined areas will eventually become vegetated through natural seeding, but the process can be hastened by planting, seeding, and supplemental treatment.

Taft silt loam (0%–2% slopes) (Ta).—This is a light-colored moderately well drained soil occurring in association with Elk, Cumberland, and Robertsville soils on terraces, mostly along the Spring River and Center Creek. It is darker colored and better drained than Robertsville silt loam but is grayer and more poorly drained than Elk or Cumberland silt loam.

Profile description:

0 to 9 inches, grayish-brown, very friable silt loam of weakly developed fine granular structure.
9 to 16 inches, gray friable silt loam with almost no structure.
16 to 24 inches, light yellowish-brown brittle or slightly hard silty clay loam or silty clay; breaks into fairly regular blocks ½ to 1 inch in diameter when dry.
24 to 40 inches, light-gray and yellowish-brown mottled silty clay loam; becomes lighter in color and somewhat coarser in texture as depth increases.

The soil throughout the entire profile is acid.

Use and management.—Taft silt loam is low in organic matter but has fairly good physical properties and responds readily to treatment. Probably 60 percent of it is in cultivation, and the rest is used for pasture. Small grains, hay, and corn are grown. Wheat is the principal small-grain crop. When fertilizer is used, wheat yields under ordinary management average about 15 bushels an acre. Korean lespedeza is extensively grown and makes a vigorous growth without soil treatment. When lime is used, sweetclover, red clover, and alfalfa can be grown.

Taft silt loam is not so well suited to corn as the Cumberland, Elk, and Huntington soils, which usually occur on the same farm. The corn is therefore grown on those stronger soils, and the Taft soil is reserved for small grains and grasses.

Verdigris fine sandy loam (0%–1% slopes) (VA).—This brown well-drained first bottom soil occurs in the area of sandstone- and shale-derived soils. It is associated with Lightning silt loam, a lighter-colored soil developed under poorer drainage. Verdigris fine sandy loam is most extensive along the North Fork but also occurs along the Little North Fork Spring River and Blackberry Creek.

The soil does not have any distinct layers. The soil material, extending to a depth of several feet without marked change, is grayish-brown or light yellowish-brown loam or fine sandy loam of weakly defined fine granular structure. The surface 6 to 8 inches is in most places slightly darker than the rest of the soil profile. This soil is moderately acid and low in organic matter.

Use and management.—Nearly all of the areas of Verdigris fine sandy loam are subject to annual overflow. Meandering streams cut many areas into units too small to cultivate profitably. Because of overflow hazard and the small size of fields, only about 40 percent of the soil is cultivated. The rest is used for pasture. Most of the pastured areas are partly forested. Corn is the principal crop, and according to the level of the management, yields range from 35 to 50 bushels an acre.

Verdigris fine sandy loam, high-bottom phase (0%–1% slopes) (VB).—This inextensive soil occurs in Spring Creek Valley below the mouth of the North Fork Spring River. The soil profile is similar to that of Verdigris fine sandy loam, but the surface soil is slightly deeper and darker. This phase is subject to occasional overflow.

Use and management.—Verdigris fine sandy loam, high-bottom phase, is for the most part cultivated, principally to corn. The yields of corn are about 35 bushels an acre under ordinary management. Under good management an average of about 55 bushels an acre may be attained.

Woodson silty clay loam, nearly level phase (1%–3% slopes) (WA).—This dark soil with a fine-textured subsoil occupies many small basin areas throughout the northeastern and central parts of the county. It is associated with Carytown silt loam but differs from that soil in having a dark-gray silty clay loam surface soil, as compared to one of light brownish-gray silt loam, and in having a moderately plastic clay subsoil instead of a very hard compacted one. Surface drainage is fair to poor; internal drainage is slow.

Profile description:

0 to 10 inches, friable coarse granular dark-gray to black silty clay loam or heavy silt loam; reaction, slightly acid.
10 to 22 inches, dark-gray friable to slightly hard silty clay loam with a well-defined coarse granular structure; very slightly acid to neutral.
22 to 30 inches, gray plastic silty clay, neutral in reaction; lime concretions present in most places below about 28 inches.
30 to 48 inches, uniform gray or light olive-gray calcareous silty clay.

Use and management.—Woodson silt loam, nearly level phase, is the only soil of the uplands in this county that contains enough lime for the growing of legumes. All grasses thrive, and because of incomplete drainage, about 50 percent of the soil is used for permanent pasture. The cultivated land is used for lespedeza (which makes a very vigorous growth), red clover, soybeans, cowpeas, corn, and small grains. High yields of corn—60 to 70 bushels an acre—are obtained in favorable seasons, but during periods of wet or dry weather, yields are reduced. The yield of corn under ordinary management is about 30 bushels an acre.

USE AND MANAGEMENT OF IMPORTANT GROUPS OF SOILS

Soils of the county suited to approximately the same uses and management are grouped in this section, and suitable uses and management are discussed for each group. The two major divisions are (1) soils of uplands and terraces and (2) soils of bottom lands. These two divisions are subdivided into various use and management groups and subgroups. The color groupings on the soil map (cover page 3) correspond to the management groupings described in the pages following. Reference to the color legend on the map, and then to the map itself, will show how various groups are distributed in the county.

SOILS OF UPLANDS AND TERRACES

The soils of the uplands and terraces are grouped as (1) soils well suited to cropping; (2) tillable soils not well suited to cultivated crops but suitable for hay and pasture; (3) stony soils not suited to cultivation but suitable for pasture; and (4) steep stony land suited mainly to forest.

SOILS WELL SUITED TO CROPPING

The soils well suited to cropping consist of soils not strongly acid and strongly acid soils.

SOILS NOT STRONGLY ACID

Woodson silty clay loam, nearly level phase, is the only agriculturally suitable soil of the uplands and terraces that is not strongly acid. Its surface soil is slightly acid to neutral, and because there is an abundance of lime in the subsoil, no additional lime is required for growing legumes.

The soil is heavy-textured and therefore somewhat difficult to till. Internal drainage is slow, and surface drainage is poor in some places. Crops are injured by extremes of either wet or dry weather, but reserves of plant food are large, and in favorable seasons the soil is highly productive. In unfavorable seasons, however, corn crops may fail completely.

Red clover and alsike clover grow vigorously on this soil; lespedeza does exceptionally well; and soybeans make good growth. Wheat grows well on drained areas but in some years the yield is reduced by excessive moisture. This soil supports some of the best quality pasture in the county. Bluegrass and white clover are the principal pasture plants.

STRONGLY ACID SOILS

The strongly acid soils are all low in organic matter and require lime and fertilizer. In this large group are all the Newtonia, Labette, Cumberland, Cherokee, Elk, Taft, Dennis, Craig, Bates, Cabanal, Riverton, Melvern, Neosho, Gerald, Carytown, Parsons, and Inola soils and all except the stony types of the Baxter and the cherty types of the Eldon series. The soils of this group will be listed and discussed under various subheadings, but the following recommendations can be made for all of those used for rotated crops:

1. Apply 2 to 3 tons of lime an acre every 10 to 12 years.
2. Supply organic matter by using green-manure legumes or barnyard manure at least every 2 or 3 years.
3. Plan to use fertilizer regularly in the rotations. All the soils are low in phosphorus, and many are low in potassium. Have soil tests made to determine the quantity and kind of fertilizer needed.

If the soils are used for permanent pasture instead of rotated crops, the need for lime and commercial fertilizer must be satisfied.

The strongly acid soils consist of (1) permeable medium-textured stone-free acid soils of high productivity; (2) permeable medium-textured acid soils of medium productivity; (3) medium-textured acid claypan soils of medium productivity.

Permeable medium-textured stone-free acid soils of high productivity

The permeable medium-textured stone-free acid soils of high productivity are as follows:

Cumberland silt loam.
Dennis silt loam, gently sloping phase.
Elk silt loam.
Labette silt loam:
    Gently sloping phase.
    Nearly level phase.
Newtonia silt loam:
    Gently sloping phase.
    Nearly level phase.

The soils of this group are not necessarily the most productive for all crops, but they are among the best for the widest range of crops. They are easy to till, have sufficient clay in the subsoil for moisture retention, and do not have a subsoil heavy enough to impede seriously penetration of water or roots. All of them have good drainage.

Regular and frequent additions of organic matter, either in the form of green manure or barnyard manure, are essential if yields are to be maintained. Alfalfa, red clover, and sweetclover can be grown successfully if lime and fertilizer are used. Lespedeza makes a good growth on these soils, but the yields and forage are increased by soil treatment.

Pastures are greatly improved by liming, by use of a phosphate fertilizer, and by seeding a mixture of legumes and grasses. A good pasture mixture, and one that will furnish a good hay crop the first year after seeding, consists of orchard grass, red clover, and lespedeza. Mixtures of orchard grass and alfalfa can be grown successfully if the soils are limed and fertilized. Rotated pastures usually produce more forage on these soils than permanent pastures.

There is no serious danger of erosion damage on nearly level areas of these soils, but there is some erosion danger on gently sloping phases. Soils on slopes should be farmed on the contour and kept covered with vegetation during winter. Terraces can be used successfully.

Permeable medium-textured acid soils of medium productivity

The permeable medium-textured acid soils of medium productivity are listed as follows:

- **Bates fine sandy loam, gently sloping phase.**
- **Baxter cherty silt loam:**
  - **Gently sloping phase.**
  - **Sloping phase.**
- **Cabanal loamy fine sand, gently sloping phase.**
- **Craig cherty silt loam, gently sloping phase.**
- **Cumberland gravelly silt loam.**
- **Eldon cherty silt loam:**
  - **Gently sloping phase.**
  - **Nearly level phase.**
- **Eldon silt loam:**
  - **Gently sloping phase.**
  - **Nearly level phase.**
- **Melvern gravelly loam, gently sloping phase.**
- **Newtonia cherty silt loam:**
  - **Gently sloping phase.**
  - **Sloping phase.**
- **Riverton gravelly loam, gently sloping phase.**
- **Taft silt loam.**

The soils of this group have good internal drainage but are somewhat more droughty than those of the group immediately preceding. The soil treatments needed are about the same as for the more productive soils. Corn is more seriously affected by midsummer droughts on these soils than on those of the group preceding, and for this reason, it is usually desirable to use most of the land for small grains, hay, or pasture. Alfalfa, red clover, and sweetclover can be grown successfully if the land is fertilized and limed. Lespedeza grows on the untreated soils but makes a better growth when they are treated. Permanent pasture on soils of this group is greatly benefited by liming, fertilizing, and reseeding.

Erosion can be controlled if the cultivated land is terraced, and farmed on the contour and the small grain-legume hay type of rotation is used most of the time.

Medium-textured acid claypan soils of medium productivity

The medium-textured acid claypan soils of medium productivity are listed as follows:

- **Carytown silt loam.**
- **Cherokee silt loam.**
- **Gerald silt loam:**
  - Depressional phase.
  - Level deep phase.
  - Level phase.
  - Level shallow phase.
  - Nearly level deep phase.
  - Nearly level phase.
  - Nearly level shallow phase.
- **Inola silt loam:**
  - Level phase.
  - Nearly level phase.
- **Neosho silt loam.**
- **Parsons loam:**
  - Level phase.
  - Nearly level phase.
- **Parsons silt loam:**
  - Level phase.
  - Nearly level phase.

The soils of this group occupy topography favorable to cultivation; have a medium-textured stone-free surface soil; and like those of the two groups previously discussed, are low in organic matter, phosphorus, and potassium. They have, in addition, a dense clay subsoil that restricts water movement and root penetration, and they are therefore not so well suited to alfalfa and such deep-rooted plants. Crops are also injured by excess moisture during periods of wet weather. Because they are waterlogged in early spring and droughty during summer, the soils are not good for growing corn. With proper treatment red clover and sweetclover can be grown.

Lespedeza thrives on the Gerald and Carytown soils, but makes small growth on untreated Parsons, Cherokee, Neosho, and Inola soils. More lespedeza of better quality can be produced on all soils of this group if they are treated. Most pastures on these claypan soils can be greatly improved by liming, fertilizing, and reseeding with a legume-grass mixture.

In level areas the soils of this group have no appreciable erosion, but surface drainage is slow in many fields. The sloping areas have better surface drainage but are subject to erosion. Contouring, terracing, and maintaining a winter cover crop will aid in erosion control.

Tile drainage of claypan soils.—Tile drainage of soils with a clay subsoil is not generally practiced in this county, as the increase in yield resulting from tiling of the claypan soils of Missouri is slight. The University of Missouri Agricultural Experiment Station conducted an experiment on the effect of tile drainage on a level area of a claypan soil in Barton County. This area is about 20 miles north of Jasper County line, and results obtained there should be applicable to claypan soils in Jasper County.

Two plots were used in this experiment—one tiled and the other not tiled. On the tiled plot, 4-inch tile was used for laterals, and 6-inch tile for major drains. The laterals were placed 6 rods apart, and the tile was laid at a depth of 2½ to 3 feet. No fertilizer or other special treatment was given the plots, as the sole purpose of the experiment was to measure the effect of drainage, and as a result yields were low. The results of the experiment are shown in table 5. It will be noted that there was generally some increase in yield due to tiling.

Blasting of claypan subsoils.—Various methods of shattering tight impervious subsoil have been attempted. Dynamite has been used, and subsoiling with various types of subsoiling plows has been tried, but these practices have not markedly increased crop yields, and the effects on the soil disappear entirely after a few years.

TABLE 5.—*Effect of tile drainage on Cherokee silt loam* (*3*)

Year	Crop	Acre yields		
		Tiled	Untiled	Increase from tiling
1907	Corn bushels	31. 1	22. 2	8. 9
1908		9. 7	9. 0	. 7
1909	Wheat do	13. 5	13. 2	. 3
1910	Cowpeas pounds	6, 631	4, 900	1, 731
1911	Corn bushels	27. 5	26. 2	1. 3
1912	Cowpeas pounds	2, 059	2, 070	----------
1913	Oats bushels	23. 8	5. 0	18. 8

A trial experiment was made on Cherokee silt loam in Barton County, Mo. Half sticks of dynamite were placed 15 feet apart each way at a depth of 40 inches and the charges were detonated. The results obtained are shown in table 6.

TABLE 6.—*Effect of blasting on Cherokee silt loam subsoil* (*3*)

Year	Crop	Acre yields		
		Blasted	Not blasted	Increase or decrease from blasting
1911	Corn bushels	18. 2	22. 5	−4. 3
1911	Cowpeas pounds	1, 504	1, 136	+368
1912	Corn bushels	14. 2	3. 7	+10. 5
1912	Cowpeas pounds	2, 308	1, 936	+372
1913	Oats bushels	19. 3	19. 1	+. 2

TILLABLE SOILS NOT WELL SUITED TO CULTIVATED CROPS BUT SUITABLE FOR HAY AND PASTURE

The tillable soils not well suited to cultivated crops but suitable for hay and pasture are as follows:

- Boone fine sandy loam:
  - Gently sloping phase.
  - Sloping phase.
- Collinsville fine sandy loam:
  - Gently sloping phase.
  - Sloping phase.
- Connor silt loam.
- Nixa cherty silt loam, gently sloping phase.
- Robertsville silt loam.

Although the soils of this group can be used for cultivated crops and some areas of all of them have been or are being cultivated, yields are low. Most areas of the Collinsville soils are covered with native grasses and are used for pasture or for prairie hay. They are apparently most profitably used for hay or pasture. The continued removal of hay is certain to deplete further their small store of plant nutrients. Use of lime and fertilizers on the native pastures and meadows would increase the yield and improve the quality of the forage.

The Nixa, Connor, and Robertsville soils occur on relatively gentle slopes and have a stone-free or moderately stony surface soil. They are forest soils and low in fertility. The Nixa soil is the most productive in this group and is used for hay and small grains. Most of it is used for hay and pasture; the acreage of small grains is limited. The application of about 2 tons of lime an acre and the equivalent of about 200 or more pounds of high-analysis mixed fertilizer annually will give good results.

The Connor and Robertsville soils have a dense clay subsoil and a very highly leached surface soil. Crop yields are very low if these soils are not treated, but increase when the soils are limed and fertilized. Because of their unfavorable physical properties the Connor and Robertsville soils are not so responsive to treatment as others of this group.

STONY SOILS NOT SUITED TO CULTIVATION BUT SUITABLE FOR PASTURE

The stony soils not suited to cultivation but suitable for pasture are as follows:

- Baxter stony silt loam:
  - Gently sloping phase.
  - Sloping phase.
- Bodine stony silt loam:
  - Gently sloping phase.
  - Moderately steep phase.
- Boone stony fine sandy loam, moderately steep phase.
- Collinsville stony fine sandy loam, sloping phase.
- Eldorado stony silt loam:
  - Gently sloping phase.
  - Sloping phase.

All soils of this group are too stony to cultivate, and most of them are on rolling to hilly topography that would make cultivation difficult. The Eldorado and Collinsville are grassland soils, and the Baxter, Boone, and Bodine are forested soils.

The Eldorado and Collinsville soils are higher in organic matter and produce more forage than the others in this group. The carrying capacity of pastures on Eldorado and Collinsville soils that are brush covered would be increased if the brush were removed.

Large areas of the Baxter, Bodine, and Boone soils are still covered with forest vegetation, and where the forest cover is dense enough to shade the ground, only a small quantity of pasture is produced.

The Baxter soils produce fairly good pasture if not too heavily forested, and cleared areas on Bodine soils produce pasture in moderate quantity. Boone soils produce a limited quantity of rather poor quality forage, but because the timber they support is also of poor quality, higher returns can be obtained from pasture than from timber.

Small areas of the Baxter, Boone, and Bodine soils can be profitably used for woodlots on nearly every farm where they occur. The woodlots should be protected from fire and from grazing.

STEEP STONY LAND SUITED MAINLY TO FOREST

Steep stony land suited mainly to forest is composed of (1) Steep stony land, Baxter soil material, and (2) Steep stony land, Bodine soil material.

The Baxter soil material, occurring in narrow bands on steep slopes along the major streams, is so shallow and occupies such steep topography that it is of limited use as pasture. It supports a vigorous stand of mixed hardwoods. If burning were controlled and pasturing were eliminated, many areas of this stony land would become valuable as farm woodlots.

The Bodine soil material is very cherty and does not support so desirable a forest growth as the Baxter soil material, but it also is best suited to forest.

SOILS OF BOTTOM LANDS

All of the bottom land, or alluvial, soils of the county can be farmed, but some are more productive and better suited to cropping than others. They are placed in three groups according to their various suitabilities as follows: (1) Permeable medium-textured soils well suited to crops; (2) poorly drained fertile soils mainly suited to pasture; and (3) poorly drained soils of low fertility mainly suited to pasture or forest.

PERMEABLE MEDIUM-TEXTURED SOILS WELL SUITED TO CROPS

The permeable medium-textured soils of the stream bottom lands are listed as follows:

Huntington gravelly silt loam.
Huntington silt loam.
Huntington silt loam, dark phase.
Huntington silt loam, high-bottom phase.
Lindside and Huntington soils.
Verdigris fine sandy loam.
Verdigris fine sandy loam, high-bottom phase.
Lindside silt loam.
Lindside silt loam, high-bottom phase.

The soils of this group are medium textured, well drained, fertile, and well suited to continued cropping. Flooding for short periods is the principal limitation to farming, but many areas also are infested with Johnson grass. Most crops common to the area can be grown, but corn is the leading crop. Higher yields of better quality crops are obtained if lime and fertilizer are used on these soils.

POORLY DRAINED FERTILE SOILS MAINLY SUITED TO PASTURE

The poorly drained fertile soils mainly suited to pasture are Dunning silty clay loam and Dunning silt loam, both of which are highly fertile. For the most part they occupy positions difficult to drain, and subsoil textures are heavy enough to make tiling hard to accomplish. The soils support exceptionally good grass and in most areas can be more profitably used for pasture than for cultivated crops. Nonetheless, high crop yields are obtained where drainage is adequate.

POORLY DRAINED SOILS OF LOW FERTILITY MAINLY SUITED TO PASTURE OR FOREST

The poorly drained soil of low fertility mainly suited to pasture or forest are Lightning silt loam and Melvin silt loam. These soils are light-colored and low in fertility. Drainage is generally poor. Nearly all areas are used for pasture or production of timber and are apparently best suited to these uses.

ADDITIONAL FACTS ABOUT JASPER COUNTY

INDUSTRIES

Agriculture and mining are the most important industries. Farming is practiced throughout the county, but mining operations are confined largely to the western and southwestern parts. In 1940 there were 2,644 persons engaged in agriculture and 1,130 in mining and quarrying. Since 1940 the number engaged in mining has probably increased.

Three plants in the county manufacture explosives and employ several hundred people. Other industry is limited chiefly to the processing of agricultural products. Several creameries, flour and feed mills, poultry dressing plants, and packing plants were operating in 1942.

The mining industry has had several contradictory effects on the economy of the county. A large urban population has made better markets for farm products, especially for fresh fruits and vegetables, but mine dumps, sump pits, and industrial areas have completely destroyed about 40 square miles for agricultural use. In addition, tailing piles, mill sites, and like obstructions have divided an even larger area into small fields, the agricultural value of which is greatly reduced. Surrounding most of the present and former mining sites are suburban settlements of various sizes. In these settlements the land is divided into small tracts of 1 to 10 acres. Production on these small tracts is for home consumption and does not provide a significant marketable surplus.

TRANSPORTATION AND MARKETS

The Missouri-Pacific, Kansas City Southern, and Frisco Railroads provide direct connections to Kansas City, St. Louis, Little Rock, Ark., and Fort Worth, Tex. United States Highways Nos. 66 and 71 intersect the county, and all-weather roads reach into all parts.

Most of the milk is sold to local processing plants. Some of the livestock is sold locally and part is shipped to Kansas City or St. Louis. Meat-packing plants are at Joplin. Some of the wheat is processed locally, and part of the crop is shipped north and east to the larger cities.

HOME IMPROVEMENTS AND SOCIAL FACILITIES

Throughout the eastern and northern parts of the county, where agriculture is the dominant enterprise, the farm homes are generally substantially built and in good repair. In 1945 about 55 percent of the rural homes had electricity, 30 percent had running water, and 32 percent had telephones.

Cultural development is highly diverse in the southwestern quarter of the county, or the industrial area. There are elaborate country estates, a large number of medium-priced, well-kept suburban or rural homes, and larger number of cabins in various degrees of disrepair. A sharp line between agriculture and industry is difficult to draw in the mining districts. Some of the land is farmed as consistently and as efficiently as in other parts of the county, but the majority of it is farmed only as a side line by people who have other employment.

School bus routes cover most of the rural areas. In 1942 many rural districts maintained an elementary school and transported the high-school students to the schools in town. By 1952, practically all the one room elementary schools had been abandoned and the rural districts consolidated.

LAND USE

Land in farms made up 88.1 percent of the county area in 1945. In that year there were 3,164 farms, and the average size was 108 acres. Farms less than 50 acres in size made up 46.4 percent of the total number, but because these small farms are mostly suburban homes for industrial workers, they do not greatly affect the agriculture of the county.

In 1945 farms ranging from 50 to 139 acres in size accounted for 24 percent of the total number in the county; farms ranging from 140 to 259 acres, 19.4 percent; and farms ranging from 260 to 1,000 acres or more, 10.2 percent.

Most of the cropland is in farms ranging from 70 to 500 acres in size. In areas outside the mining district, the most common full-time farm is 140 to 160 acres in size. Many dairy farms, however, are smaller than this.

The farm land is used for corn, wheat and other small grains, hay, and forage. Wheat and corn are both grown throughout the county. Wheat is dominant in the prairie land, and corn is the principal crop on the alluvial soils. Hay and forage crops vary according to location. Production of wild bluestem hay is confined almost entirely to Cherokee soil areas in the northwestern part of the county, whereas lespedeza is grown most extensively in the eastern part. Alfalfa is produced mainly on the well-drained alluvial soils, such as Huntington silt loam, and the reddish-brown soils of the uplands, such as Newtonia silt loam.

CROPS

Corn and small grains are the leading sources of crop income in the county, and hay and forage are next in importance. The acreages of principal crops and numbers of fruit and nut trees and grapevines are given in table 7 for stated years.

It is difficult to determine whether the changes shown in table 7 are lasting shifts in land use or temporary changes in cropping brought about by such factors as unusual weather or prices. Nonetheless, some major changes in land use are indicated. The acreage of corn has increased since 1919, but the acreage of wheat has decreased steadily. The acreage in hay and forage has increased since 1919, and there has been a shift in types of hay and forage crops. The acreage of perennial grasses has decreased, whereas the acreage of legumes, especially of lespedeza, has greatly increased. The University of Missouri Agricultural Experiment Station reported 90,000 acres of lespedeza grown in the county in 1944 (*4*), but this figure included lespedeza grown for pasture as well as that cut for hay, and therefore does not conform with the figure in table 7. The soybean acreage has increased since 1919, and also the acreage of grain sorghums.

TABLE 7.—*Acreage of principal crops and number of fruit and nut trees and grapevines in Jasper County, Mo., in stated years*

Crop	1919	1929	1939	1944
Corn:	*Acres*	*Acres*	*Acres*	*Acres*
For all purposes	35, 675	45, 797	36, 311	38, 446
For grain	(1)	36, 376	35, 735	37, 921
Small grains threshed:				
Wheat	107, 938	68, 829	49, 276	41, 415
Oats	33, 601	14, 826	31, 717	32, 821
Rye	82	9	231	1, 277
Barley	17	117	5, 755	2, 337
Grain sorghums for grain	(1)	583	1, 037	1, 827
Cowpeas grown alone	(1)	2, 179	4, 758	937
Soybeans grown alone	(1)	4, 122	3, 427	7, 997
All hay, silage, and forage	21, 880	26, 092	32, 599	38, 197
Timothy and timothy and clover mixed	1, 752	4, 943	1, 176	1, 043
Clover alone	176	176	(1)	(1)
Alfalfa	416	387	472	464
Lespedeza for hay	(1)	(1)	10, 276	15, 780
Other cultivated grasses	801	2, 077	1, 103	1, 383
Wild grasses	11, 637	10, 022	8, 961	9, 983
Grains cut green	710	485	1, 759	450
Annual legumes for hay	673	4, 593	[2] 6, 181	[2] 3, 491
Grain sorghums for hay and forage	[3] 1, 340	2, 101	2, 417	5, 603
Silage crops	792	609	(1)	(1)
Coarse forage	[4] 3, 683	[4] 699	(1)	(1)
Potatoes	638	544	254	[5] 239
Sweetpotatoes and yams	98	119	27	78
All other vegetables	174	339	110	239
Small fruits:				
Strawberries	388	1, 843	154	77
Raspberries and loganberries	(1)	17	2	1
Blackberries and dewberries (tame)	106	24	9	16
Tree fruits, nuts, and grapes [6]:	*Number*	*Number*	*Number*	*Number*
Apples ... trees	34, 008	38, 343	15, 317	16, 513
Peaches ... do	24, 830	14, 213	8, 191	20, 421
Pears ... do	3, 807	3, 000	1, 342	2, 029
Plums and prunes ... do	4, 013	2, 464	1, 677	1, 987
Cherries ... do	10, 481	2, 653	1, 122	3, 320
Pecans ... do	(1)	(1)	264	71
Grapevines	16, 888	109, 326	29, 949	33, 357

[1] Not available.
[2] Cowpeas and soybeans.
[3] Root crops for forage.
[4] Corn.
[5] Harvested for sale.
[6] Number of trees and vines of all ages reported for 1944; for all other years trees and vines are of bearing age.

Wheat is drilled in the fall, after the first of October, usually on land that has been plowed in July or August. The application of about 150 pounds an acre of a mixed fertilizer is a standard practice. Wheat is harvested in June. Some is cut with binders and shocked and threshed, but a large and constantly increasing percentage is harvested with combines. Most of the wheat crop is sold off the farm.

Corn is planted during April and May, generally on land that has been plowed the preceding fall or winter. When fertilizer is used on corn, it is either plowed under or is applied in the rows at the time of planting. The rates of application vary from 150 to 400 pounds an acre. Most of the corn is gathered by hand. Some corn is shocked and used for fodder; on dairy farms some is harvested for silage; and a few fields of corn are hogged off. To a great extent, the corn crop is fed to livestock on farms.

Oats are sowed in spring as soon as the ground can be worked. The most common practice is to disk the ground and sow the oats broadcast. Fertilizers are not commonly used. The oats are harvested about the first of July, and most of the crop is cut with a binder so the straw can be saved. Much of the grain is used on the farm for feed.

Most of the hay is baled immediately after harvest. Much of the wild hay is sold, but usually legume hay and forage crops are fed on the farms where they are produced.

ROTATIONS AND FERTILIZERS

Systematic crop rotations are not generally practiced, but a general rotation of corn, oats, wheat, and lespedeza is approximated on many farms. Records of the University of Missouri Agricultural Experiment Station show that 6,000 tons of commercial fertilizers and 45,000 tons of limestone were used in 1944. In 1950, 12,666 tons of fertilizers were used. Most of the fertilizer is applied with wheat. Limestone is used to improve the stand and quality of legumes.

PERMANENT PASTURE

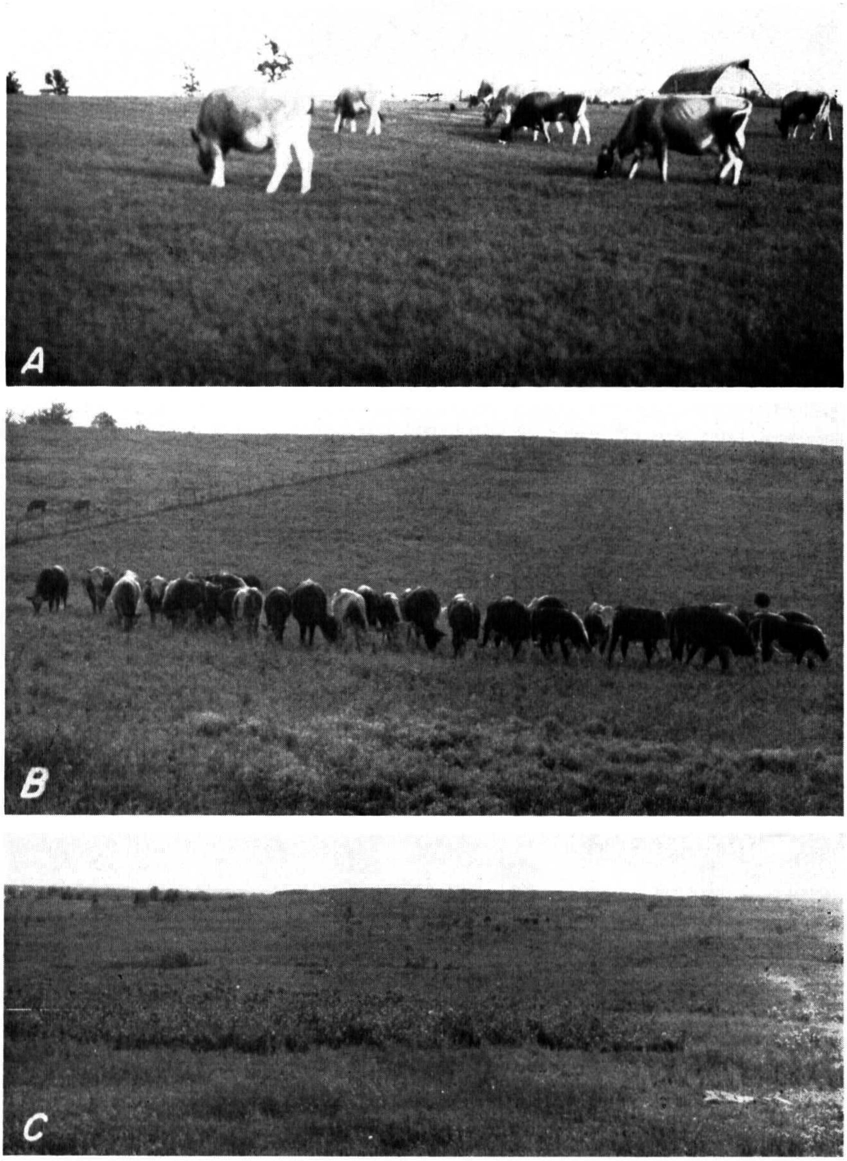
The estimated area of permanent pasture is 70,000 acres. The better pastures are on the alluvial and the prairie soils in the limestone area. The limestone-prairie soils—Eldon, Craig, and Newtonia—generally support a pasture cover composed of hop clover, Canada and Kentucky bluegrasses, Korean lespedeza, and wild grasses (pl. 6 *A*).

Most of the rolling stony land cleared of forest is used for permanent pasture, and Korean lespedeza is the dominant forage plant (pl. 6, *B*). Where sandstone occurs, the pastures are of inferior quality and bluegrass does not thrive. The shallow sandstone soils support mainly a stand of native wild grasses in which big and little bluestem predominate (pl. 6, *C*). On the cherty Bodine soils the dominant plant is a wild, coarse bunchgrass known locally as grease grass.

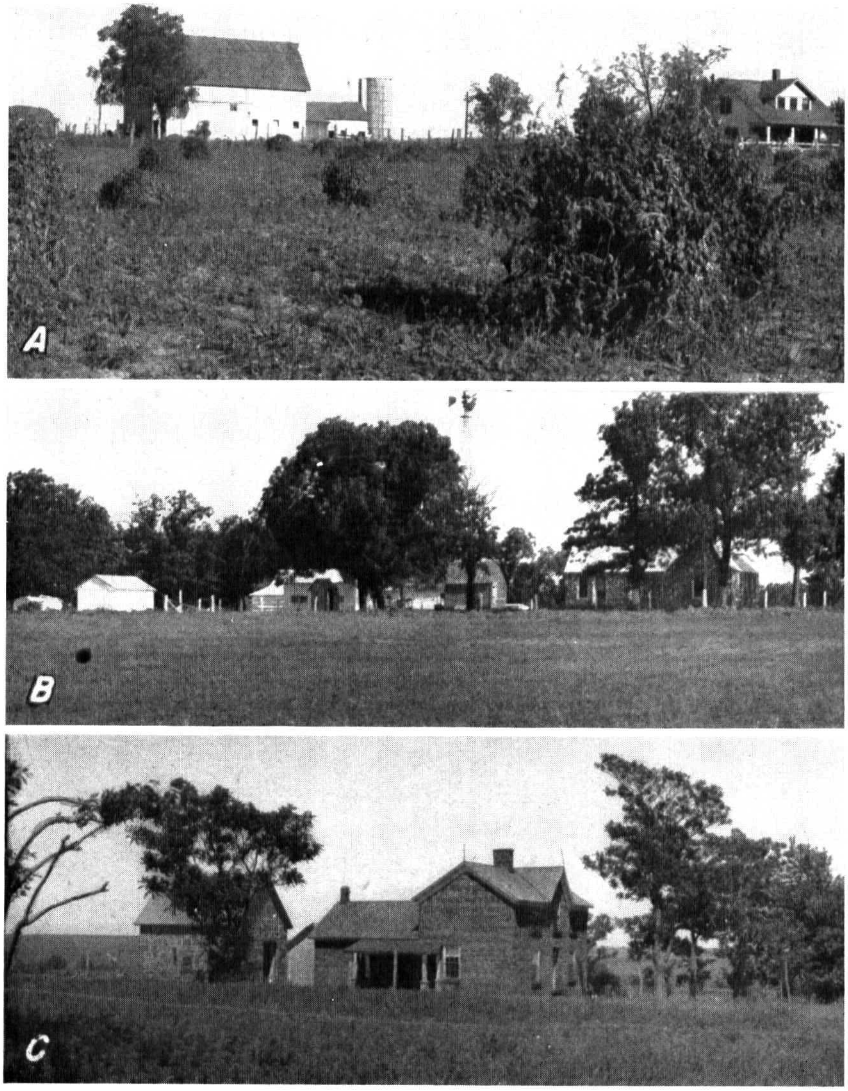
The acreage of permanent pasture has probably remained about constant, but the acreage of supplemental pasture has increased during the past 20 years. Korean lespedeza, following small grain, is widely used as a supplement to permanent pasture. Small grains are sometimes pastured early in spring, and some Sudan grass is grown for summer pasture. Orchard grass is grown extensively on the Baxter, Newtonia, and Eldon soils. Redtop is grown for seed and pasture on the level Gerald soils.

LIVESTOCK AND LIVESTOCK PRODUCTS

Livestock farming has been important in this county since settlement began. Cattle lead in importance and number. The number of dairy cattle, especially, has greatly increased since 1919. The number of swine is correlated with the acreage of corn; and the decline in number of work stock results from the increased use of tractors and



Representative pasture in different soil areas of Jasper County.
A, Limestone-prairie soils area: Lespedeza pasture on the gently sloping phase of Newtonia cherty silt loam.
B, Rolling light-colored cherty soils area: Mixed pasture on Baxter soils.
C, Shallow sandy soils area: Native grass pasture on Collinsville soils.



Representative farmsteads in different soil areas of Jasper County.

A, Limestone-prairie soils area: Soybean shocks on the nearly level phase of Newtonia silt loam in foreground; typical farm buildings in background.

B, Forested cherty soils area: Lespedeza on the gently sloping phase of Nixa cherty silt loam in foreground; farmhouse built of chert boulders and other farm buildings in background.

C, Shallow sandy soils area: Buildings of sandstone in the Collinsville-Bates soil area.

power machinery on the farms. The number of livestock on farms is given in table 8 for stated years.

TABLE 8.—*Livestock on farms in Jasper County, Mo., in stated years*

Livestock	1919	1929	1939	1944
	Number	*Number*	*Number*	*Number*
Horses	9, 579	6, 180	[1] 4, 519	4, 516
Mules	3, 873	2, 678	[1] 1, 473	1, 014
Cattle	23, 295	29, 565	[1] 24, 643	39, 783
Sheep	5, 404	7, 605	[2] 5, 242	8, 120
Goats	397	285	[3] 715	496
Swine	19, 706	11, 259	[3] 14, 119	14, 909
Chickens	222, 412	[1] 237, 336	[3] 166, 665	207, 221
Other poultry	3, 049	(5)	[3] 1, 325	(5)
Beehives	1, 538	1, 804	417	(5)

[1] Over 3 months old.
[2] Over 6 months old.
[3] Over 4 months old.
[4] Includes turkeys, ducks, geese, and guineas on hand.
[5] Data not available.

Dairy cattle.—Dairying has been an important enterprise in this county for the past 35 years. Dairy cattle of the Jersey breed are most numerous, but there are several herds of high-producing Guernsey cattle. Better grades of dairy cattle have been introduced within the past 10 years. The forage for dairy cattle is raised on the farms, but a considerable part of the grain for feed is purchased.

The volume of milk produced has greatly increased since 1919, and better markets for dairy products have developed. Most of the milk is now sold in whole fluid form. Production of milk totaled 8,271,930 gallons in 1944, and of this total 6,154,836 gallons was sold as whole milk. In 1939, milk production totaled 5,115,971 gallons, and 2,988,707 gallons was sold as whole milk. The production of milk therefore increased by 3,155,959 gallons in the period 1939–44, and the sale of whole milk increased by 3,166,129 gallons in the same period.

Beef cattle.—Most of the beef cattle are grades of the Hereford or Shorthorn breeds, but a considerable number have a mixture of Jersey blood. Some cattle are finished on corn, but large numbers are sold as grass-fat beef in early fall. Nearly all of the feed for beef cattle is produced locally.

Swine.—Most of the the swine are of the Duroc, Poland China, or Hampshire breeds. The number, in comparison with the number of cattle, is not large. Some corn is imported nearly every year for fattening hogs. The hogs are marketed mostly at Joplin.

Sheep.—Only a relatively small number of sheep are raised, and most of them are Hampshire and Western cross-breeds. The flocks are small and are kept to utilize forage that would otherwise be wasted.

TYPES OF FARMS

The total number of farms in the county was 3,164 in 1945, and of this number, 3,061 farms could be classified according to type and total value of products as follows: Producing primarily for own household use, 953; general, 643; dairy, 720; livestock, 305; poultry, 131; all other crop, 266; vegetable, 13; horticultural specialty, 17; fruit and nut, 7; and forest-products, 6.

The subsistence farms, or those producing mainly for own household use, are operated by employed persons who use the farm as a home and for raising part of their food. These farms are usually less than 40 acres in size and are located mainly in the southwestern, or industrial, part of the county.

In the agricultural area field crops provide the largest single source of income, but combined income from sale of livestock and dairy products exceeds that received from sale of field crops. The cash-grain farms predominate in the northwestern part of the county on the Parsons and Cherokee soils. The livestock and dairy farms are more numerous on the Eldon, Gerald, and Newtonia soils in the central and eastern parts. Beef cattle are raised on most of the farms, even on those where dairying is the main enterprise. Some representative farmsteads are shown in plate 7.

FARM TENURE

Owners operated 66.5 percent; tenants, 33.3 percent; and managers, 0.2 percent of the farms in 1945. The number of cash tenants totaled slightly more than 43 percent of all tenants; share-cash tenants, 23 percent; and share tenants, croppers, and other unspecified tenants, the remaining 34 percent. On a share-crop basis, one-third of the wheat crop and two-fifths of the corn crop is usually given as rent. Tenants farmed 77,379 acres of the 174,814 acres of cropland harvested in 1944.

WILDLIFE

Large numbers of deer, wild turkey, and some bison were in this area at the time of settlement, but none of these remain. Red squirrels and cottontail rabbits are common, and there are some gray squirrels and jack rabbits. Quail are relatively abundant, and a few flocks of prairie chickens still survive.

The Missouri Conservation Commission has made an intensive study of wildlife population and potentialities in most of the major soil areas of the State. Two of the areas studied are in Jasper County. One of these, containing 14 square miles and mainly on Gerald soils, is a short distance east of the town of Jasper. The other one, near Asbury, covers 13 square miles in an area of Cherokee and Parsons soils.

The results[7] of a census of wildlife population per square mile (*5*) for these two areas are shown as follows:

	Gerald soil area	*Cherokee-Parsons soil area*
Quail observed	71	9
Rabbits killed	22	23
Fur bearers (pelts taken):		
Mink	0	.15
Opossum	32	14
Skunk	12	2
Muskrat	24	8
Coyote	4	.15

Figures are not exact but were obtained in the same manner on the two areas and are comparable. The wildlife population is about three times as dense on the Gerald as on the Cherokee-Parsons soil area.

The difference in the wildlife population on the two areas results from differences in land use, types of farming, and crop yields—all of which are dependent on the soils of the area. The fertility of the Gerald soils is somewhat higher than that of the Parsons soils. Thus, plants growing on Gerald soils are more nutritious than those on Parsons-Cherokee soil areas. Lespedeza grows readily on the Gerald soils but does not make a good growth without soil treatment on the Parsons or Cherokee soils. Because lespedeza is a common food for rabbits and quail, it is to be expected that these forms of wildlife will be more abundant where this kind of food is readily available.

The Parsons and Cherokee soil areas are held in large farms, and the fields are large. Most of the land is used for wheat or prairie grass, and the grass is either closely pastured or cut for hay. Under these uses the land affords scant cover for game during some seasons of the year. The Gerald soils are used more for general farming; fields are smaller; and consequently there is more cover for game.

The water supply is another factor contributing to differences in wildlife population. Small streams bordering Gerald soil areas are generally spring-fed and contain water throughout the year, whereas only the largest streams bordering the Parsons and Cherokee soil areas flow throughout the year, and all the rest are dry except during periods of rainy weather.

No comparable figures are available for the other soil areas, but observations indicate that the wildlife population is lowest on the Parsons-Cherokee soils areas. Wildlife is probably most abundant on the Huntington and Verdigris soils, the brown well-drained bottom land soils.

MORPHOLOGY, GENESIS, AND CLASSIFICATION OF SOILS

Soil is the product of the forces of weathering and soil development acting on materials deposited or accumulated by geologic agencies. The characteristics of the soil at any given point depend on (1) the physical and mineralogical composition of the parent material, (2) the climate under which the soil material has accumulated and existed since accumulation, (3) the plant and animal life in and on the soil, (4) the relief, or lay of the land, and (5) the length of time the forces of development have acted on the material.

FACTORS OF SOIL FORMATION AS RELATED TO JASPER COUNTY

All of the major factors of soil formation have influenced the development of soils in this county, but to a varying degree. The principal soil differences are due to differences in parent material, vegetation, and relief. The five factors and their interrelations, as they pertain to soils of this county, are discussed in the following paragraphs.

PARENT MATERIAL

The soils of this county are formed from parent materials deposited during five geologic ages: (1) Mississippian, (2) Pennsylvanian, (3) Tertiary or Cretaceous, (4) Quaternary, and (5) Pleistocene (*9*).

The principal Mississippian deposits are limestones containing varying quantities of chert, but some shales are also present. Except for the northwestern one-third, most of the county is underlain by limestone rock of Mississippian age. When the limestone formations are subjected to weathering, the carbonates of calcium and magnesium that make up most of the rock are removed by solution, and the impurities in the rock remain. The soils developed over limestone are therefore formed from impurities in the limestone, and from the layer of loess, or wind-deposited material, which blanketed the area during the Pleistocene epoch.

The principal impurities in the Mississippian limestones are chert, silt-sized minerals, and clay. The chert is very resistant to weathering and remains as fragments little altered by the processes of soil formation. The clay impurity of the limestone remains as a matrix in the chert mass and usually becomes red. This clay residuum from the weathering of limestone reflects the influence of soil-forming forces, whereas the chert is practically inert. Clay taken near Webb City from a cavity in Burlington limestone, a formation of Mississippian geologic age, is a mixture of halloysite and hematite (*8*).

The chert, red clay material, and loess compose the parent materials. Most of the soils in the limestone area are therefore cherty. Occasionally, however, extremely little chert is present, and the soil developed almost entirely from the red clay material and loess. In some places in the limestone area, the clay is derived from thin seams of shale in the limestone formation. Large tracts of nearly level upland in the area of limestone-residuum soils are stone-free in the free surface soil in such tracts is probably derived from the layer of upper part of the profile and very stony in the lower. The chert-loess that covered the area during the Pleistocene epoch.

The Pennsylvania deposits are noncalcareous sandstones and shales, which are exposed at the surface over the northwestern third of the county. Loess covered these deposits also. The soils weathering from these deposits are strongly acid.

The Tertiary or Cretaceous deposits, consisting of rounded chert gravel in an acid clay matrix, occur as surface deposits in limited areas in the western part of the county. The deposits are highly weathered and give rise to strongly acid soils similar to those developed from the Pennsylvanian formations, These soils were also influenced by a layer of loess.

The Quaternary deposits are alluvial in origin, are made up of unconsolidated material on flood plains and terraces of existing streams, and have a wide range in texture. Soils of the terraces in the limestone area and those along streams that drain soils of the sandstone and shale uplands resemble in many respects the soils of the uplands. The soil material has been in place long enough to have acquired characteristics of the soils of the uplands. Neosho silt loam, for example, is a soil of the terraces similar to Cherokee silt loam, a soil of the uplands.

CLIMATE

The climate—rainfall, temperature, and humidity—is essentially uniform over the entire county, but climatic influences on the soils and the processes of soil formation may be variable from place to place.

This variation depends on characteristics of the soil or soil material and on the relief, which, in turn, strongly influences drainage, aeration, runoff, erosion, and exposure to sun and wind.

VEGETATION

The correlation between native vegetation and relief is direct. The hilly areas along major streams were forested, and the broad nearly level to sloping interstream divides were grass-covered. The differences in vegetation probably result from differences in soil moisture and temperature relations, which are, in turn, the results of differences in relief.

The differences in vegetation are associated with major soil differences. The soils with a forest cover are lighter colored than those from similar parent material that developed under a grass cover.

RELIEF

Differences in relief are associated with differences in soil conditions and kinds of vegetation, but the degree of correlation varies. In the sandstone and shale areas the correlation between relief and soil conditions is extremely close. Steep slopes are occupied by Lithosols (Collinsville soils); moderate slopes, by open permeable soils (Dennis and Bates soils); nearly level areas by moderately developed Planosols (Parsons soils); and level areas, by strongly developed Planosols (Cherokee soil).

The limestone area shows a much less distinct relation between soil conditions and relief. Soil characteristics are determined primarily by parent material and only slightly by relief.

Among the forested soils of the limestone area, the stony Bodine soils generally occupy the steeper slopes, and the less stony Nixa soil occupies the ridge tops. Possibly, however, the parent material of the Bodine soils, rather than the relief, may be the cause of differences between the two, for Bodine soils also occur on ridge tops.

For the prairie soils of limestone derivation, direct correlation between relief and soil characteristics is difficult to determine. The grassland Planosols (Gerald soils) occur only in nearly level areas, but stony prairie soils (Eldon) and stone-free prairie soils (Labette and Newtonia) occur on nearly level topography as well as on slopes.

TIME

The present land surface of the county is part of the Tertiary plain and is therefore extremely old. The age is indicated by the depth of the soil mantle, the depth of soil leaching, and the peneplanation of the surface.

The length of time the forces of development have acted on the soil materials causes differences among soils of the flood plains, and among most soils of the uplands.

CLASSIFICATION OF SOILS

The soil series of this county are classified by soil orders and great soil groups as shown in table 9.

TABLE 9.—*Soil series of Jasper County, Mo., classified by soil orders and great soil groups*

ZONAL SOILS

Great soil group and series	Parent material	Relief
Prairie and Reddish Prairie:		
Bates	Sandstone residuum	Gently sloping.
Craig	Cherty limestone residuum.	Do.
Dennis [1]	Acid sandy shale residuum.	Do.
Eldon [1]	Cherty limestone residuum.	Nearly level to sloping.
Labette [1]	Limestone residuum	Nearly level to gently sloping.
Newtonia	do	Nearly level to sloping.
Riverton	Old gravelly alluvium	Gently sloping.
Red-Yellow Podzolic:		
Baxter	Cherty limestone residuum.	Gently sloping to sloping.
Bodine	do	Gently sloping to moderately steep.
Cabanal	Old terrace deposits from sandstone and shale uplands.	Gently sloping.
Elk [2]	Terrace deposits from limestone uplands.	Nearly level to gently sloping.
Cumberland	do	Do.
Nixa	Cherty limestone residuum.	Gently sloping.
Taft [2]	Terrace deposits from limestone uplands.	Nearly level.
INTRAZONAL SOILS		
Planosols (grassland):		
Cherokee	Acid shale residuum	Level.
Gerald	Residuum from cherty limestone and some shale.	Level to nearly level.
Inola	Fine-textured alluvial deposits over gravel.	Do.
Neosho	Alluvial deposits from sandstone.	Nearly level to level.
Parsons	Acid sandstone and shale	Level to nearly level.
Planosols (forest):		
Connor	Alluvial deposits from sandstone and shale.	Level.
Robertsville	Alluvial deposit from limestone.	Do.
Rendzina:		
Woodson	Calcareous shale residuum	Nearly level (shallow basins).
Solonetzlike [3]:		
Carytown	Alkaline shale residuum	Do.

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[1] Transitional between Prairie and Reddish Prairie great soil groups.

[2] Transitional between Red-Yellow Podzolic and Gray-Brown Podzolic great soil groups.

[3] Tentative—not an established great soil group.

TABLE 9.—*Soil series of Jasper County, Mo., classified by soil orders and great soil groups*—Continued

AZONAL SOILS

Great soil group and series	Parent material	Relief
Lithosols (grassland):		
Collinsville	Sandstone residuum	Gently sloping to sloping.
Eldorado	Residuum from cherty limestone.	Do.
Melvern	Old gravelly alluvium	Gently sloping.
Lithosols (forest):		
Boone	Sandstone residuum	Gently sloping to moderately steep.
Alluvial:		
Dunning	Alluvium from limestone	Level.
Huntington	do	Do.
Lightning	Alluvium fron sandstone and shale.	Do.
Lindside	Alluvium from limestone	Do.
Melvin	do	Do.
Verdigris	Alluvium from sandstone and shale.	Do.

MORPHOLOGY OF SOILS REPRESENTING THE GREAT SOIL GROUPS

A soil of this county representative of each of the Prairie, Reddish Prairie, Red-Yellow Podzolic, and Planosols great soil groups is described in this section, and its morphology is discussed.

The great soil groups listed above are the most important ones recognized in Jasper County. There are, however, fairly extensive areas of Lithosols, or very shallow stony soils, and Alluvial soils. There are also limited areas of Rendzina, or dark high-lime soils, as well as a Solonetzlike soil that has soluble salt concentrations in the lower horizons much above the average for this region. The Solonetzlike soil can be considered as a subgroup of the Planosols, as the morphology is very similar.

PRAIRIE SOILS

Bates fine sandy loam, gently sloping phase, is representative of the Prairie soils of this county. It developed on moderate slopes under grass vegetation from noncalcareous sandstone of Pennsylvanian age.

Following is a profile description taken on a 4-percent slope:

A_1. 0 to 9 inches, pale-brown when dry to weak-brown to brownish-gray when moist, very friable to nearly loose very fine, fine sandy loam weakly developed fine granular structure.

A_3. 9 to 14 inches, pale brown when dry to weak-brown when moist, friable fine sandy loam; well-developed medium granular structure.

B_2. 14 to 24 inches, light-brown when dry to moderate-brown when moist, friable sandy clay loam with faint mottlings of moderate brown and strong brown; coarse granular structure.

B_3. 24 to 36 inches, moderate yellowish-brown and moderate reddish-brown mottled sandy clay loam of moderately developed coarse granular structure; fragments of soft sandstone are scattered throughout; horizon is lighter textured than the B_2.

C. 36 to 42 inches, dusky yellow to weak-orange weakly cemented soft thin-bedded partly disintegrated sandstone.

Note the shallow depth to which soil development has taken place. There is a distinct but not extreme zone of clay accumulation in the subsoil. The moderately light color of the surface soil is characteristic of the Prairie soils of this area. Mechanical and chemical analyses of this same profile are given in table 10.

REDDISH PRAIRIE SOILS

Newtonia silt loam, gently sloping phase, is representative of the Reddish Prairie soils. It developed from chert-free limestone residuum under grass vegetation or vegetation transitional between that of forest or prairie.

The following describes a profile of this soil taken on a 3-percent slope in a cultivated field in sec. 4, T. 29 N., R. 31 W.:

A_1. 0 to 9 inches, moderate-brown [8] very friable silt loam of weakly developed medium granular structure.

A_3. 9 to 18 inches, weak reddish-brown friable silty clay loam of moderately developed coarse granular structure.

B_1. 18 to 30 inches, moderate reddish-brown friable silty clay of well-developed coarse granular structure.

C. 30 to 40 inches, moderate reddish-brown hard silty clay of well-developed coarse granular to fine nuciform structure; little apparent change to a depth of about 5 feet, where material rests directly on partly weathered, bedded limestone.

No true zone of clay accumulation occurs in the profile. The silt loam surface soil grades into a silty clay loam horizon, which, in turn, grades into the silty clay parent material. Mechanical and chemical analyses of the profile are given in table 10.

The parent material of the Newtonia soil is red clay limestone residuum reported to be a mixture of halloysite and hematite (*9*). Halloysite ($H_4Al_2Si_2O_2$) has a silica-sesquioxide ratio of 2 to 1. Because clays having such a low silica-sesquioxide ratio are known to have a low exchange capacity, the exchange capacity of Newtonia soil theoretically should be low.

Determinations were made on samples of Newtonia silt loam collected 2 miles west of Carytown with the results shown in table 11. As shown in this table, the Newtonia surface soil has a low base exchange capacity, and the increase in the subsoil is very slight, even though Newtonia subsoil contains more clay than the surface soil. The low exchange capacity indicates that the clay in Newtonia soil has a low silica-sesquioxide ratio.

In summary, the Newtonia profile is characterized by a low exchange capacity, by the absence of a definite zone of clay accumulation in the subsoil, and probably by a low silica-sesquioxide ratio. Formation of Newtonia soil probably entails the destruction of clay and the release of sesquioxides. The sesquioxides and some kaolinite remain, but the silicate silicon is removed from the soil. The soil properties just summarized for Newtonia soil are not characteristic of all Prairie soils, but are the properties of those soils developed on red clayey limestone residuum.

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[8] Colors determined on an air-dry basis according to preliminary standards established by the United States Department of Agriculture (7).

Table 10.—*Mechanical and chemical analyses of three soils of Jasper County, Mo.*

Soil name and sample No	Depth	Texture	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay	Percentage of particles—		Organic content[1]	pH
										Less than 0.005 mm.	Greater than 2.0 mm.		
Bates fine sandy loam, gently sloping phase:	*Inches*		*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*			*Percent*	
346172	0–9	Very fine sandy loam	1.5	0.6	0.6	30.5	35.3	22.3	0.9	10.6	1.0	1.0	4.8
346173	9–14	Fine sandy loam	6.3	1.1	.5	24.4	29.2	22.8	15.7	18.0	23.0	1.6	4.6
346174	14–24	Sandy clay loam	.1	.1	.4	24.2	26.6	13.6	35.0	37.7	(2)	1.1	4.6
346175	24–36	do	0	0	.3	23.1	38.2	13.2	25.2	27.9	(2)	.4	4.5
346176	36–42	Fine sandy loam	.3	.5	2.9	69.0	4.1	9.1	14.1	16.3	(2)	.5	4.6
Gerald silt loam, nearly level phase:													
346142	0–8	Silt loam	1.2	2.6	1.5	2.5	4.4	71.1	16.7	21.8	5.0	1.9	4.9
346143	8–13	do	2.1	2.8	1.1	1.6	2.8	64.9	24.7	31.7	3.0	1.0	4.6
346144	13–24	Silty clay but near boundary of clay.	.4	.5	.3	.7	1.3	41.5	55.3	61.8	(2)	1.1	4.6
346145	24–32	Silty clay	1.6	.7	.4	1.1	2.4	50.0	43.8	50.8	8.0	.7	4.7
346146	32–38	Very cherty silty clay loam	2.0	1.7	1.0	2.8	4.7	56.1	31.7	38.3	81.0	.6	4.8
Newtonia silt loam, gently sloping phase:													
346155	0–9	Silt loam	0	.2	.6	4.4	3.5	68.7	22.6	29.0	(2)	1.8	5.0
346156	9–18	Silty clay loam	.3	.6	.7	3.8	3.0	63.3	28.3	34.4	(2)	1.7	5.3
346157	18–30	Silty clay	0	.2	.4	3.3	2.9	49.7	43.5	49.0	(2)	.6	5.0
346158	30–40	do	.2	.3	.4	3.2	3.0	46.8	46.1	51.4	(2)	.2	5.0

[1] Organic content determined by use of hydrogen peroxide (H_2O_2).

[2] Less than 0.5 percent.

TABLE 11.—*Exchange properties of Newtonia silt loam* [1]

Depth	Base exchange capacity	Exchangeable calcium
Inches	*Milliequivalents per 100 gm. soil*	*Milliequivalents per 100 gm. soil*
0–8	8.4	6.3
8–17	10.3	5.7
17–23	11.5	5.4
30+	9.8	5.4

[1] Determinations made by E. R. Graham and M. Stickrod, Department of Soils, University of Missouri; neutral ammonium acetate leachate method was used.

RED-YELLOW PODZOLIC SOILS

The Baxter soils are representative of the Red-Yellow Podzolic soils of this county. The following describes a profile of Baxter cherty silt loam, sloping phase:

- A_1. 0 to 8 inches, brown when moist to light-brown when dry, very friable cherty silt loam with a moderately developed fine granular structure; chert fragments, most of them less than 3 inches in diameter, occupy about 15 percent of the soil mass.
- A_3. 8 to 14 inches, reddish-brown when moist to light reddish-brown when dry, friable cherty silt loam or silty clay loam; moderately developed medium to coarse granular structure.
- B_1. 14 to 20 inches, dark reddish-brown when moist to yellowish-red when dry, friable cherty silty clay loam; weakly developed fine blocky structure.
- B_2. 20 to 36 inches, yellowish-red, both moist and dry, slightly hard cherty silty clay loam; moderately developed medium blocky structure; chert fragments occupy 30 to 40 percent of the soil mass.
- B_3. 36 to 40 inches, dark-red slightly hard silty clay loam or silty clay in a mass of brecciated chert.

The brecciated chert horizon extends to a depth of several feet and grades into weathered limestone of Mississippian geologic age.

PLANOSOLS

Soils with a medium-textured surface soil and a very dense clay subsoil are classified as Planosols. Such soils occur on nearly level uplands in all parts of the county. Gerald silt loam is the most extensive soil of this group, and except for its underlying cherty horizons, its profile typifies all of the Planosols of the grasslands in this county.

The following describes a profile of Gerald silt loam, nearly level phase, taken on a 1½-percent slope in the southwest quarter of sec. 16, T. 28 N., R. 31, W.:

- A_1. 0 to 12 inches, brownish-gray very friable silt loam of moderately developed firm granular structure.
- A_2. 12 to 18 inches, light brownish-gray friable silt loam of weakly developed coarse granular structure.
- B_2. 18 to 30 inches, pale brown and moderate-brown mottled stiff compact clay of well-developed fine blocky structure.
- B_3. 30 to 40 inches, light yellowish-brown and light-brown mottled stiff silty clay of moderately developed fine blocky structure.
- D. 40 inches +, mass of chert, the upper 6 inches of which is weakly cemented.

The results of mechanical and chemical analyses of the profile just described are given in table 10.

Exchange properties for Gerald silt loam are given in table 12. The exchange capacity is low in the surface layer, just as for the samples of Newtonia silt loam (see table 11). Unlike the Newtonia soil, however, the exchange capacity of the Gerald increases markedly in the subsoil. The maximum base exchange capacity of the Gerald subsoil is 19.8 milliequivalents per 100 grams of soil, as compared to a maximum of 11.5 milliequivalents for Newtonia subsoil. According to the exchange analyses of these two soils, the Gerald has an exchange capacity of 35.8 milliequivalents per 100 grams of clay, whereas the Newtonia has a capacity of 24.8 milliequivalents per 100 grams of clay.

TABLE 12.—*Exchange properties of Gerald silt loam*[1]

Horizon	Depth	Base exchange capacity	Exchangeable calcium
	Inches	*Milliequivalents per 100 gm. soil*	*Milliequivalents per 100 gm. soil*
A_1	0–8	8.0	3.7
A_2	10–14	7.8	2.0
B_2	18–24	19.8	4.7

[1] Determinations by E. R. Graham and M. Stickrod, Department of Soils, University of Missouri; neutral ammonium acetate leachate method was used.

SOIL SURVEY METHODS AND DEFINITIONS

Soil surveying consists of examining, classifying, and mapping of soils in the field. The soil scientist walks over the area at intervals not more than one-quarter mile apart and bores into the soil with an auger or digs holes with a spade. Each such boring or hole shows the soil to consist of several distinctly different layers, called horizons, which collectively are known as the soil profile. Each of these layers is studied carefully for the things about it that affect plant growth.

The color of each layer is noted. There is usually a relationship between the darkness of the topmost layer of soil and its content of organic matter; streaks and spots of gray, yellow, and brown in lower layers generally indicate poor drainage and poor aeration.

Texture—the content of sand, silt, and clay in each layer—is determined by the feel of the soil when rubbed between the fingers and is checked by mechanical analyses in the laboratory. Texture determines to a considerable extent the quantity of moisture the soil will hold available to plants, whether plant nutrients or fertilizers will be held by the soil in forms available to plants or will be leached out, and the difficulty or ease of cultivating the soil.

Soil structure, or granulation, and the number of pores or open spaces between soil particles determine the permeability or perviousness of the soil. and consequently, the ease with which plant roots penetrate the soil and water enters it.

Consistence, or the tendency of the soil to crumble or to stick together, determines the degree of difficulty that will be encountered in keeping the soil open and porous under cultivation. Consistence covers such soil characteristics as hardness, friability, plasticity, stickiness, compactness, toughness, and cementation.

Surface soil ordinarily refers to the surface layer, which is usually 6 to 12 or more inches thick. The layer just below the surface soil is the subsoil; the layer beneath the subsoil, the substratum.

The kind of rocks and the parent soil material that develops from these rocks affect the quantity and kind of plant nutrients found in the soil. Simple chemical tests are made to show the degree of acidity of the soil, and the depth to bedrock or to compact layers is determined. The quantity of gravel or rocks that may interfere with cultivation, the steepness and kind of slope, the quantity of soil lost by erosion, and other external features are observed.

On the basis of all the characteristics here listed, soil areas much alike in kind, thickness, and arrangement of their layers are mapped as one soil type. Some soil types are separated into two or more phases. For example, if a soil type has slopes that range from 2 to 12 percent, the type may be mapped in two phases, a gently sloping phase (2- to 6-percent slopes) and a sloping phase (6- to 12-percent slopes); or a soil that has been eroded in places may be mapped in two or more phases—an uneroded, or normal, phase (denoted by the name of the soil type only), an eroded phase, and perhaps a severely eroded phase. A soil type is divided into phases primarily because of differences in the soil other than those of kind, thickness, and arrangement of layers. The slope of a soil, the frequency of outcropping bedrock, the extent of erosion, or the content of stone are examples of characteristics that might divide a soil type into phases.

The soil type, or where the soil type is subdivided, the soil phase, is the unit of mapping. It is the unit, or the kind of soil, that is most nearly uniform and has the narrowest range of characteristics. For this reason land use and soil management practices can be more definitely specified for the soil type, or phase, than for broader groups of soils that contain more variation.

Two or more soil types may have similar profiles, that is, the soil layers may be nearly the same, but the texture, especially of the surface layer, will differ. As long as the other characteristics of the soil layers are similar, those soils are considered to belong to the same soil series. A soil series, therefore, consists of all the soil types that have about the same kind, thickness, and arrangement of layers, except for texture, particularly of the surface layer, whether the number of such soil types be only one or several.

The name of a place near where a soil series was first found is chosen as the name of the series. Parsons, Eldon, Riverton, and Newtonia are familiar place names in the region in which this survey was made, and they are the names of soil series occurring in Jasper County.

When very small areas of two or more kinds of soil are so intricately mixed that they cannot be shown separately on a map of the scale used, they are mapped together, and the areas of the mixture are called a soil complex. Lindside and Huntington soils is a complex occurring in this county. Lindside soils predominate in the complex but Huntington and Dunning soils are included.

Areas having little true soil are not designated with series and type names, but are given descriptive names. Chat piles, Strip mines, and Rough stony land, are names of such areas in this county.

The soil surveyor makes a map of the county or area, showing the location of each of the soil types and phases in relation to roads, houses, streams, section and township lines, and other local cultural and natural features of the landscape.

Mapping in Jasper County was done on aerial photographs having a scale of approximately 3 inches to the mile. The soil boundaries and names were placed on these aerial photographs, and this information was used to compile the map accompanying this report. More information regarding slope, erosion, and land use was shown on the aerial photographs than on the published map. Copies of these aerial photographs are on file at the office of the Agricultural Extension Agent at Carthage, Mo., and can be referred to if more detailed information than that furnished on the published map is desired.

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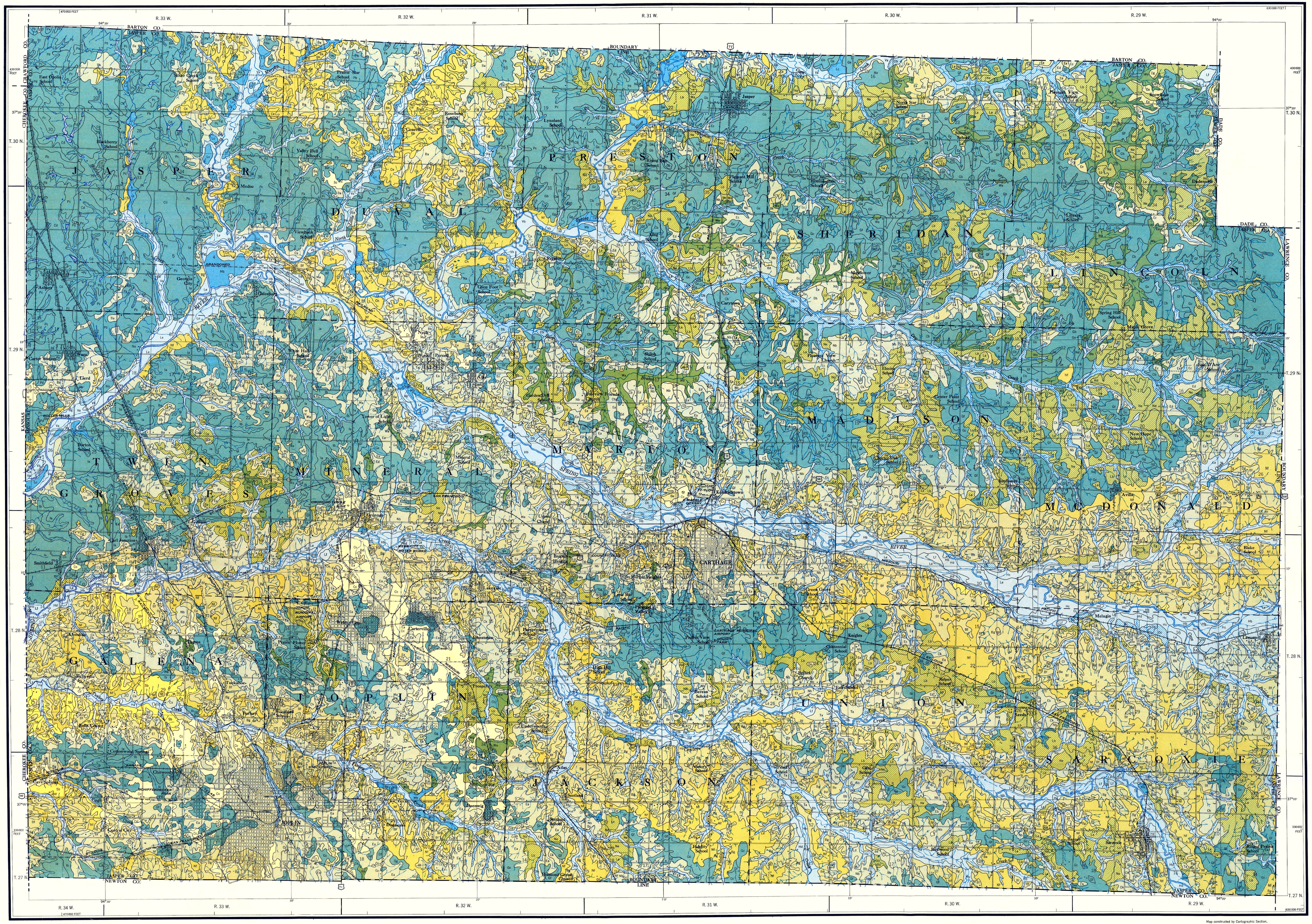
SOILS OF JASPER COUNTY, MISSOURI: SUMMARY OF IMPORTANT CHARACTERISTICS

Soil	Map symbol	Dominant slope	Permeability		Occurrence of high water table	Severity of flood	Surface drainage	Erosion hazard	Workability	Resistance to drought	Natural fertility
		Percent	Surface soil	Subsoil							
Bates fine sandy loam, gently sloping phase	Ba	2–6	Moderately rapid	Moderate	None	None	Good	Severe if cultivated	Good	Fair	Moderately low.
Baxter cherty silt loam: Gently sloping phase	Bb	2–6	do	Rapid	do	do	do	Moderate	Fair	do	Moderate.
Sloping phase	Bc	6–12	do	do	do	do	do	If cultivated, moderately severe.	do	do	Do.
Baxter stony silt loam: Gently sloping phase	Bd	2–6	do	do	do	do	do	Slight to moderate	Poor	do	Do.
Sloping phase	Be	6–18	do	do	do	do	do	Moderate	do	Fair to poor	Do.
Bodine stony silt loam: Gently sloping phase	Bf	1–6	Rapid	do	do	do	do	Slight to moderate	do	Poor	Low.
Moderately steep phase	Bg	8–20	do	do	do	do	do	Moderate if cleared	do	do	Do.
Boone fine sandy loam: Gently sloping phase	Bh	1–6	do	do	do	do	do	Moderate	Good	do	Do.
Sloping phase	Bk	6–10	do	do	do	do	do	Severe if cultivated	do	do	Do.
Boone stony fine sandy loam, moderately steep phase.	Bl	8–20	do	do	do	do	do	Slight under forest or pasture.	Very poor	do	Do.
Cabanal loamy fine sand, gently sloping phase	Ca	1–5	Moderately rapid	Moderate	do	do	do	Moderate	Good	Fair	Moderately low.
Carytown silt loam	Cb	0–2	Moderately slow	Very slow	Common	Slight	Fair	Slight	Fair	do	Moderate.
Chat piles	Cc	Variable	Very rapid	Very rapid	Nonagricultural land						
Cherokee silt loam	Cd	0–1	Moderately slow	Very slow	Temporary—above clay.	None	Moderately poor	Slight	Fair to good	Poor	Low.
Collinsville fine sandy loam: Gently sloping phase	Ce	2–6	Moderately rapid	Rapid	None	do	Good	Severe if cultivated	do	do	Moderately low.
Sloping phase	Cf	6–10	do	do	do	do	do	Very severe if cultivated	do	do	Do.
Collinsville stony fine sandy loam, sloping phase.	Cg	5–12	do	do	do	do	do	Slight under pasture	Poor	do	Do.
Connor silt loam	Ch	0–1	Moderate	Very slow	Temporary table common.	Slight	Fair	do	Fair	do	Very low.
Craig cherty silt loam, gently sloping phase	Ck	2–6	do	Moderately slow	None	None	Good	Moderate if cultivated	do	Fair	Moderate.
Cumberland gravelly silt loam	Cl	1–5	do	Moderately rapid	do	Slight	do	Moderate	do	do	Do.
Cumberland silt loam	Cm	1–5	do	Moderate	do	Very slight	do	do	Good	Good	Moderately high.
Dennis silt loam, gently sloping phase	Da	2–6	do	Moderately slow	do	None	do	do	do	do	Moderate.
Dunning silt loam	Db	0–1	do	Slow	Frequent	Severe	Fair	None	Fair	do	High.
Dunning silty clay loam	Dc	0–1	Moderately slow	do	do	do	Generally poor	do	Poor	Fair to good	Do.
Eldon cherty silt loam: Gently sloping phase	Ea	2–7	Moderately rapid	Rapid	None	None	Good	Moderate	Fair	Poor	Moderate.
Nearly level phase	Eb	1–2	do	do	do	do	do	do	do	Fair to poor	Do.
Eldon silt loam: Gently sloping phase	Ec	2–7	do	do	do	do	do	Moderately severe	Good	do	Do.
Nearly level phase	Ed	1–2	do	do	do	do	do	Slight	do	do	Do.
Eldorado stony silt loam: Gently sloping phase	Ee	1–6	Rapid	do	do	do	do	do	Poor	Poor	Do.
Sloping phase	Ef	6–14	do	do	do	do	do	do	do	do	Do.
Elk silt loam	Eg	1–4	Moderate	Moderate	do	Slight	do	Moderate	Good	Fair to good	Do.
Gerald silt loam: Depressional phase	Ga	0–2	do	Slow	Temporary table common.	do	Fair to poor	Slight	Fair	Fair	Do.
Level deep phase	Gb	0–1	do	do	None	None	do	do	Good	do	Do.
Level phase	Gc	0–1	do	do	do	do	do	do	do	do	Do.
Level shallow phase	Gd	0–1	do	do	do	do	do	do	do	do	Do.
Nearly level deep phase	Ge	1–3	do	do	do	do	Good	Moderate	do	do	Do.
Nearly level shallow phase	Gg	1–3	do	do	do	do	do	do	do	do	Do.
Nearly level phase	Gf	1–3	do	do	do	do	do	do	do	do	Do.
Huntington gravelly silt loam	Ha	0–1	do	Moderate	Very limited	Severe	do	None	Fair	do	Do.
Huntington silt loam	Hb	0–1	do	do	do	do	Fair to good	do	Good	Good	Moderately high.
Dark phase	Hc	0–1	do	do	do	do	Good	do	do	do	Do.
High-bottom phase	Hd	0–1	do	do	None	Moderate	do	do	do	do	Do.
Inola silt loam: Level phase	Ia	0–1	do	Slow	do	None	Fair to poor	Slight	do	Fair	Moderately low.
Nearly level phase	Ib	1–3	do	do	do	do	Good	Moderate	do	do	Do.
Labette silt loam: Gently sloping phase	La	2–6	do	Moderate	do	do	do	do	do	Good	Moderately high.
Nearly level phase	Lb	0–2	do	do	do	do	do	Slight	do	do	Do.
Lightning silt loam	Lc	0–1	do	Slow	Frequent	Severe	Fair to poor	None	Fair	Poor	Low.
Lindside and Huntington soils	Ld	0–1	See Lindside silt loam and Huntington silt loam.								
Lindside silt loam	Le	0–1	Moderate	Moderately slow	Occasional	Severe	Fair	None	Good	Fair	Moderate.
High-bottom phase	Lf	0–1	do	do	Infrequent	Moderate	Good	do	do	do	Do.
Melvern gravelly loam, gently sloping phase	Ma	2–5	Rapid	Rapid	None	None	do	Moderate	Fair	Poor	Low.
Melvin silt loam	Mb	0–1	Moderate	Very slow	Frequent	Severe	Poor	None	Poor	do	Do.
Neosho silt loam	Na	0–2	Moderately slow	do	Temporary table above clay.	Slight	Moderately poor	Slight	Fair	do	Moderately low.
Newtonia cherty silt loam: Gently sloping phase	Nb	2–6	Moderate	Moderately rapid	None	None	Good	Moderate to severe	do	Fair	Moderate.
Sloping phase	Nc	6–11	do	do	do	do	do	Severe if cultivated	Fair to poor	do	Do.
Newtonia silt loam: Gently sloping phase	Nd	2–6	do	Moderate	do	do	do	Moderate to severe	Good	Fair to good	Do.
Nearly level phase	Ne	0–2	do	do	do	do	do	Slight to moderate	do	do	Do.
Nixa cherty silt loam, gently sloping phase	Nf	1–6	do	do	do	do	do	Moderate to severe	Fair to poor	Fair to poor	Low.
Parsons loam: Level phase	Pa	0–1	do	Slow	do	do	Fair to poor	Slight	Good	Fair	Moderately low.
Nearly level phase	Pb	1–3	do	do	do	do	Good	Moderate	do	do	Do.
Parsons silt loam: Level phase	Pc	0–1	do	do	do	do	Fair to poor	Slight	do	do	Do.
Nearly level phase	Pd	1–3	do	do	do	do	Good	Moderate	do	do	Do.
Riverton gravelly loam, gently sloping phase	Ra	2–5	do	Moderate	do	do	do	Moderate to severe	Fair to good	do	Do.
Robertsville silt loam	Rb	0–1	do	Very slow	Temporary table common.	Slight	Poor	Slight	Fair to poor	Poor	Very low.
Steep stony land: Baxter soil material	Sa	10–35	Rapid	Rapid	None	None	Good	Moderate	Very poor	do	Moderate.
Bodine soil material	Sb	6–25	do	do	do	do	do	Slight to moderate	do	do	Low.
Strip mines	Sc	Variable	Variable	Variable	Nonagricultural land						
Taft silt loam	Ta	0–2	Moderate	Moderately slow	None	Slight	Fair	Slight	Fair to good	Fair	Moderate.
Verdigris fine sandy loam	Va	0–1	do	Moderate	Very limited	Severe	Good	None	Good	Good	Do.
High-bottom phase	Vb	0–1	do	do	None	Moderate	do	do	do	do	Do.
Woodson silty clay loam, nearly level phase	Wa	1–3	Moderately slow	Slow	Frequent	Slight	Fair to poor	Slight	Fair to poor	Good for all except corn.	High.

U. S. DEPARTMENT OF AGRICULTURE

SOIL MAP
JASPER COUNTY - MISSOURI

UNIVERSITY OF MISSOURI AGRICULTURAL EXPERIMENT STATION



J. Kenneth Ableiter, Chief Soil Correlator.
C. P. Barnes, Chief Analyst, Soil Uses and Productivity.
Correlation and inspection by Earl D. Fowler,
Principal Soil Correlator, Northern States.
Soils surveyed 1940-42 by W. D. Shrader, in Charge,
M. E. Springer, Robert Hamby, and W. J. Pettijohn,
Missouri Agricultural Experiment Station and
John T. Miller, U. S. Department of Agriculture.

Scale 1:62,285

1 ½ 0 1 2 Miles

5000 0 5000 10000 Feet

Map constructed by Cartographic Section,
Division of Soil Survey, BPISAE, from aerial
photographs by photogrammetric methods.
H. W. Whitlock, Engineer, in Charge.
Polyconic projection, 1927 North American datum.
10000 foot grid based on Missouri (West) rectangular
coordinate system.

LEGEND

Soil	Slopes	Symbol
Bates fine sandy loam, gently sloping phase	(2-6 percent slopes)	Ba
Baxter cherty silt loam, gently sloping phase	(2-6 percent slopes)	Bb
Baxter cherty silt loam, sloping phase	(6-12 percent slopes)	Bc
Baxter stony silt loam, gently sloping phase	(2-6 percent slopes)	Bd
Baxter stony silt loam, sloping phase	(6-18 percent slopes)	Be
Bodine stony silt loam, gently sloping phase	(1-6 percent slopes)	Bf
Bodine stony silt loam, moderately steep phase	(8-20 percent slopes)	Bg
Boone fine sandy loam, gently sloping phase	(1-6 percent slopes)	Bh
Boone fine sandy loam, sloping phase	(6-10 percent slopes)	Bk
Boone stony fine sandy loam, moderately steep phase	(8-20 percent slopes)	Bl
Cabanal loamy fine sand, gently sloping phase	(1-5 percent slopes)	Ca
Carytown silt loam	(0-2 percent slopes)	Cb
Chat piles	(Variable)	Cc
Cherokee silt loam	(0-1 percent slopes)	Cd
Collinsville fine sandy loam, gently sloping phase	(2-6 percent slopes)	Ce
Collinsville fine sandy loam, sloping phase	(6-10 percent slopes)	Cf
Collinsville stony fine sandy loam, sloping phase	(5-12 percent slopes)	Cg
Connor silt loam	(0-1 percent slopes)	Ch
Craig cherty silt loam, gently sloping phase	(2-6 percent slopes)	Ck
Cumberland gravelly silt loam	(1-5 percent slopes)	Cl
Cumberland silt loam	(1-5 percent slopes)	Cm
Dennis silt loam, gently sloping phase	(2-6 percent slopes)	Da
Dunning silt loam	(0-1 percent slopes)	Db
Dunning silty clay loam	(0-1 percent slopes)	Dc
Eldon cherty silt loam, gently sloping phase	(2-7 percent slopes)	Ea
Eldon cherty silt loam, nearly level phase	(1-2 percent slopes)	Eb
Eldon silt loam, gently sloping phase	(2-7 percent slopes)	Ec
Eldon silt loam, nearly level phase	(1-2 percent slopes)	Ed
Eldorado stony silt loam, gently sloping phase	(1-6 percent slopes)	Ee
Eldorado stony silt loam, sloping phase	(6-14 percent slopes)	Ef
Elk silt loam	(1-4 percent slopes)	Eg
Gerald silt loam, depressional phase	(0-2 percent slopes)	Ga
Gerald silt loam, level deep phase	(0-1 percent slopes)	Gb
Gerald silt loam, level phase	(0-1 percent slopes)	Gc
Gerald silt loam, level shallow phase	(0-1 percent slopes)	Gd
Gerald silt loam, nearly level deep phase	(1-3 percent slopes)	Ge
Gerald silt loam, nearly level phase	(1-3 percent slopes)	Gf
Gerald silt loam, nearly level shallow phase	(1-3 percent slopes)	Gg
Huntington gravelly silt loam	(0-1 percent slopes)	Ha
Huntington silt loam	(0-1 percent slopes)	Hb
Huntington silt loam, dark phase	(0-1 percent slopes)	Hc
Huntington silt loam, high-bottom phase	(0-1 percent slopes)	Hd
Inola silt loam, level phase	(0-1 percent slopes)	Ia
Inola silt loam, nearly level phase	(1-3 percent slopes)	Ib
Labette silt loam, gently sloping phase	(2-6 percent slopes)	La
Labette silt loam, nearly level phase	(0-2 percent slopes)	Lb
Lightning silt loam	(0-1 percent slopes)	Lc
Lindside and Huntington soils	(0-1 percent slopes)	Ld
Lindside silt loam	(0-1 percent slopes)	Le
Lindside silt loam, high-bottom phase	(0-1 percent slopes)	Lf
Melvern gravelly loam, gently sloping phase	(2-5 percent slopes)	Ma
Melvin silt loam	(0-1 percent slopes)	Mb
Neosho silt loam	(0-2 percent slopes)	Na
Newtonia cherty silt loam, gently sloping phase	(2-6 percent slopes)	Nb
Newtonia cherty silt loam, sloping phase	(6-11 percent slopes)	Nc
Newtonia silt loam, gently sloping phase	(2-6 percent slopes)	Nd
Newtonia silt loam, nearly level phase	(0-2 percent slopes)	Ne
Nixa cherty silt loam, gently sloping phase	(1-6 percent slopes)	Nf
Parsons loam, level phase	(0-1 percent slopes)	Pa
Parsons loam, nearly level phase	(1-3 percent slopes)	Pb
Parsons silt loam, level phase	(0-1 percent slopes)	Pc
Parsons silt loam, nearly level phase	(1-3 percent slopes)	Pd
Riverton gravelly loam, gently sloping phase	(2-5 percent slopes)	Ra
Robertsville silt loam	(0-1 percent slopes)	Rb
Steep stony land, Baxter soil material	(10-35 percent slopes)	Sa
Steep stony land, Bodine soil material	(6-25 percent slopes)	Sb
Strip mines	(Variable)	Sc
Taft silt loam	(0-2 percent slopes)	Ta
Verdigris fine sandy loam	(0-1 percent slopes)	Va
Verdigris fine sandy loam, high-bottom phase	(0-1 percent slopes)	Vb
Woodson silty clay loam, nearly level phase	(1-3 percent slopes)	Wa

NOTE: **Percentage figures shown above legend blocks, represent the dominant slope.**

COLOR GROUPING

SOILS OF UPLANDS AND TERRACES
SOILS WELL SUITED TO CROPPING

SOILS WHICH ARE NOT STRONGLY ACID

- Woodson silty clay loam, nearly level phase

STRONGLY ACID SOILS

PERMEABLE MEDIUM-TEXTURED STONE-FREE ACID SOILS OF HIGH PRODUCTIVITY

- Cumberland silt loam
- Dennis silt loam, gently sloping phase
- Elk silt loam
- Labette silt loam, gently sloping phase
- Labette silt loam, nearly level phase
- Newtonia silt loam, gently sloping phase
- Newtonia silt loam, nearly level phase

PERMEABLE MEDIUM-TEXTURED ACID SOILS OF MEDIUM PRODUCTIVITY

- Bates fine sandy loam, gently sloping phase
- Baxter cherty silt loam, gently sloping phase
- Baxter cherty silt loam, sloping phase
- Cabanal loamy fine sand, gently sloping phase
- Craig cherty silt loam, gently sloping phase
- Cumberland gravelly silt loam
- Eldon cherty silt loam, gently sloping phase
- Eldon cherty silt loam, nearly level phase
- Eldon silt loam, gently sloping phase
- Eldon silt loam, nearly level phase
- Melvern gravelly loam, gently sloping phase
- Newtonia cherty silt loam, gently sloping phase
- Newtonia cherty silt loam, sloping phase
- Riverton gravelly loam, gently sloping phase
- Taft silt loam

MEDIUM-TEXTURED CLAYPAN SOILS OF MEDIUM PRODUCTIVITY

- Carytown silt loam
- Cherokee silt loam
- Gerald silt loam, depressional phase
- Gerald silt loam, level deep phase
- Gerald silt loam, level phase
- Gerald silt loam, level shallow phase
- Gerald silt loam, nearly level deep phase
- Gerald silt loam, nearly level phase
- Gerald silt loam, nearly level shallow phase
- Inola silt loam, level phase
- Inola silt loam, nearly level phase
- Neosho silt loam
- Parsons loam, level phase
- Parsons loam, nearly level phase
- Parsons silt loam, level phase
- Parsons silt loam, nearly level phase

TILLABLE SOILS NOT WELL SUITED TO CULTIVATED CROPS BUT SUITABLE FOR HAY OR PASTURE

- Boone fine sandy loam, gently sloping phase
- Boone fine sandy loam, sloping phase
- Collinsville fine sandy loam, gently sloping phase
- Collinsville fine sandy loam, sloping phase
- Connor silt loam
- Nixa cherty silt loam, gently sloping phase
- Robertsville silt loam

SOILS OF UPLANDS AND TERRACES (CONTINUED)
STONY SOILS NOT SUITED TO CULTIVATION BUT SUITABLE FOR PASTURE

- Baxter stony silt loam, gently sloping phase
- Baxter stony silt loam, sloping phase
- Bodine stony silt loam, gently sloping phase
- Bodine stony silt loam, moderately steep phase
- Boone stony fine sandy loam, moderately steep phase
- Collinsville stony fine sandy loam, sloping phase
- Eldorado stony silt loam, gently sloping phase
- Eldorado stony silt loam, sloping phase

STEEP STONY LAND SUITED MAINLY TO FOREST

- Steep stony land, Baxter soil material
- Steep stony land, Bodine soil material

SOILS OF BOTTOM LANDS
PERMEABLE MEDIUM-TEXTURED SOILS WELL SUITED TO CROPS

- Huntington gravelly silt loam
- Huntington silt loam
- Huntington silt loam, dark phase
- Huntington silt loam, high-bottom phase
- Lindside and Huntington soils
- Lindside silt loam
- Lindside silt loam, high-bottom phase
- Verdigris fine sandy loam
- Verdigris fine sandy loam, high-bottom phase

POORLY DRAINED FERTILE SOILS MAINLY SUITED TO PASTURE

- Dunning silt loam
- Dunning silty clay loam

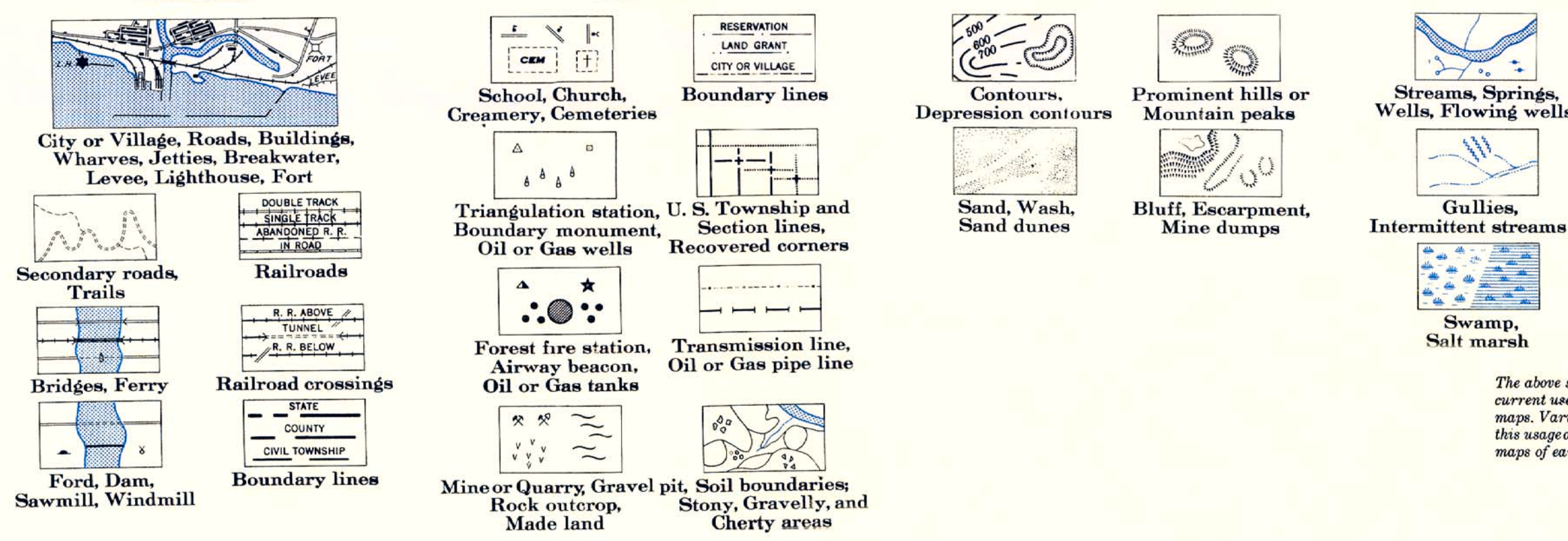
POORLY DRAINED SOILS OF LOW FERTILITY MAINLY SUITED TO PASTURE OR FOREST

- Lightning silt loam
- Melvin silt loam

CHAT PILES AND STRIP MINES

- Chat piles
- Strip mines

CONVENTIONAL SIGNS



CULTURE
(Printed in black)
City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, Lighthouse, Fort
Secondary roads, Trails
Railroads
DOUBLE TRACK
SINGLE TRACK
ABANDONED R. R.
IN ROAD
Bridges, Ferry
Railroad crossings
R. R. ABOVE
TUNNEL
R. R. BELOW
Ford, Dam, Sawmill, Windmill
Boundary lines
STATE
COUNTY
CIVIL TOWNSHIP
CULTURE
(Printed in black)
School, Church, Creamery, Cemeteries
CEM
Boundary lines
RESERVATION
LAND GRANT
CITY OR VILLAGE
Triangulation station, Boundary monument, Oil or Gas wells
U. S. Township and Section lines, Recovered corners
Forest fire station, Airway beacon, Oil or Gas tanks
Transmission line, Oil or Gas pipe line
Mine or Quarry, Gravel pit, Rock outcrop, Made land
Soil boundaries; Stony, Gravelly, and Cherty areas
RELIEF
(Printed in brown or black)
Contours, Depression contours
500
600
700
Prominent hills or Mountain peaks
Sand, Wash, Sand dunes
Bluff, Escarpment, Mine dumps
DRAINAGE
(Printed in blue)
Streams, Springs, Wells, Flowing wells
Lakes, Ponds, Intermittent lakes
Gullies, Intermittent streams
Water pipe lines, Canals, Ditches, Flumes
Swamp, Salt marsh
Submerged marsh, Tidal flats

The above signs are in current use on the soil maps. Variations from this usage appear in some maps of earlier dates.